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JOHN F. DASHIELL, *Editor*

An Experimental Investigation of the Creative Process in Music

The Transposability of Visual Design Stimuli to Musical Themes

By

RUDOLPH R. WILLMANN

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Rudolph R. Willmann

New York, Aug. 30, 1941

"To us, alas, sight and sound, inner and outer, soul and body, God and World, have fallen apart. What we knew as children we now must grope for. Only grown-up children—artists and wise men—know this always, radiating life in their glance, listening to the blossoming around."—HORNBOSTEL

AN EXPERIMENTAL INVESTIGATION OF THE CREATIVE PROCESS IN MUSIC

I. Purpose and Background

PURPOSE OF THE STUDY

THE PURPOSE of this study is to investigate one phase of the creative process in music. That phase, generally stated, is the effect on the resultant creative product of a visual design when used as a stimulus by a composer. More specifically it is:

1. To determine whether or not a visual design stimulus will suggest to different composers musical themes with similar characteristics.
2. To determine whether or not the characteristic qualities of these themes are sufficiently individual that they can be associated with the respective stimulating designs.
3. To determine whether or not these designs will suggest to high school students themes with characteristics similar to those present in themes by the composers.

ORIENTATION OF THE STUDY

The present study does not follow directly any previous study or group of studies. It does, however, have its orientation in two general areas of psychological investigation, synesthesia and the psychology of the creative process. In the first area it can be related to that group of studies dealing with the psychological phenomena variously known as the unity of the senses, the interrelations of the senses, and the cooperation of the senses, but it goes beyond any of these in that it deals with the creative process. In the second area this study deals more directly with the creative process in music.

SENSORY STIMULI AND SENSORY OR SYMPATHETIC RESPONSES

In 1925, Hornbostel (19)[1] released an article which drew attention to the unity of the senses. In a translation of it by Elizabeth Koffka and Warren Vinton appearing in *A Source Book of Gestalt Psychology* (20:214) is the statement: ". . . what is essential in the sensuous-perceptible is not that which separates the senses from one another, but that which unites them; unites them among themselves; unites them with the entire (even with the non-sensuous) experience in ourselves; and with all the external world that there is to be experienced."

Investigators in ever increasing numbers have studied this "essential" and attempted to find out in what respects the senses are united. Most of the results of their work have been summarized by Gilbert (12) and Ryan (34). Gilbert's summary contains 58 references and considers ". . . only experiments which specifically demonstrate the efforts of heteromodal stimulation on *sensitivity*—the so-called 'dynamogenic effect' of auxiliary stimulation" (12:381). He cites the tentative conclusions that can be drawn from the experimental evidence available to date which deals with stimulus intensity as:

> a. Under conditions of momentary heteromodal stimulation (a) a sufficiently intense stimulus will momentarily reduce sensitivity

---

[1] The number in parentheses refers to the corresponding number in the Bibliography. When two numbers appear separated by a colon, the first is the Bibliography reference number, the second, the page in the reference.

> in another modality, and increase it after an optimum interval (about ½ sec.); (b) a less intense heteromodal stimulus will momentarily increase sensitivity.
>
> b. Under conditions of prolonged stimulation, there is some evidence that the *quality* of the heteromodal stimulus may determine the direction of the effect, some stimuli acting as excitants, others as depressants. It is not clear, however, whether there is a differential effect among the various modalities.
>
> c. The effect will be limited by the lability of the sensation affected, and individual differences in the susceptibility to heteromodal influence. (12:391).

Regarding other effects, he states that "The reported effects of heteromodal stimulation in space, color, and pitch discrimination may be regarded, for the most part, as secondary effects, depending on the effect of heteromodal stimulation on intensive sensitivity." (12:398). His theory of the phenomena is that an intense stimulus first "drains off" energy, then an excess of energy is irradiated causing super-excitability. This, he contends, will take into account temporal relationships (12:402).

Ryan's summary mentioned above discusses 89 studies. A number of them deal with the dynamogenic intersensory relations, where stimulation of one modality increases sensitivity or acuity in another. At the conclusion of his catalogue of this particular group he states "They leave little doubt that there is a dynamic interplay between sensory systems of the organism, although the exact nature of the influence of one modality upon another is by no means clear" (34:667). The majority of the studies he discusses are concerned with the cooperative function of intersensory relations. They will be considered in the next section of this report.

Several citations of the specific results reported by some of the investigators will serve to illustrate the type of findings in this area. Hartmann (18) reports that visual acuity of the right eye was increased when the left eye was not used for vision but was illuminated by a strong light. He reports further (16) that visual acuity of the right eye, the left eye covered, was enhanced when the subject was stimulated by a sound of 2100 d.v., by a sound of 180 d.v., by the smell of citronellol and xylenol crystals, by contact of a small metal weight on the back of the left hand, and by the prick of a pin. The same investigator (17) has shown that in most cases a strong general illumination aids in the discrimination of pitch and intensity difference. The auditory threshold, according to Child and Wendt (5), is increased when a tone, barely audible, is preceded a second or less by a brief sudden strong illumination. Zietz (40) indicates that a tone seems higher in a lighted room than in the dark. The immediate effect and the effect after a rest period upon the sensibility of the organs of vision by the stimulation of the senses of vision, hearing, taste, and smell were investigated by Allen and Schwartz (1). They found that in some cases the sensations were enhanced and in others depressed by immediate action but that a reversal occurred during the rest period. They conclude that there is an oscillatory effect in sense organs after stimulation and that the complete sensory apparatus must be regarded essentially as a unit.

Observations concerning the unity of the senses by no means started with Hornbostel. Thomasius Bartholinus (3) is reported (17:813) to have announced in 1669 that the hearing of the partially deaf was better in the light than in the dark. The investigations of Urbantschitsch (36) dealing with the various senses were recognized by James as concluding ". . . that all our sense-organs influence each other's sensations." (22:29). In 1923 Diserens (8) summarized 46 reports of investigations concerning the effects of musical stimuli on bodily states and physical reactions. In all cases there were noticeable effects, the character of which frequently depended on the pitch, timbre, and intensity of the tone or on the type of musical selection used as the stimulus. He felt that more investigation would be needed in order to determine the precise influence of different types of musical selections.

Gilliland and Moore (13) took a step in that direction when they played recordings of the First Movement of Beethoven's Fifth Symphony and the First Movement of Tschaikowsky's Sixth Symphony as classical selections and "That's It," a fox trot, and "Umbrellas to Mend," a one step, to a group of subjects at 25 different hearings in order to compare the immediate and long time effects of these two types of compositions. They found that the particular group of subjects used ranked the classical selections 22 per cent higher in enjoyment than the popular selections at the outset and that the difference was still greater at the conclusion. The average tapping rate of the subjects was slightly higher for the popular music at the beginning but the difference had almost entirely disappeared on the twenty-fifth hearing. Strength of grip was somewhat favored by the effect of popular music in the beginning but at the end there was a slight advantage in favor of the classical selections. Pulse rate was higher during the popular selections and remained the same throughout the repetitions. By means of photographs it was ascertained that repetitions of the classical music produced an attitude favorable to the best type of morale while familiarization with jazz made for a listless attitude.

From the brief account which has just preceded it is quite evident that there is a carry-over from a sensory stimulus to a sensory or a sympathetic response.

SENSORY STIMULI AND SELECTIVE RESPONSES

Another group of studies which deal with sensory stimuli and selective responses belong in this same general area. It is not possible to draw a sharp distinction between these and the preceding group except that responses in these involve conscious selectivity from among a number of possible choices whereas responses in the previous group were more a statement of condition or state, or the indication of a reaction.

In Ryan's summary, a number of investigations classified as pertaining to the cooperative functions of the senses could be considered under this category. Two illustrations will be mentioned. He reports (34:681) that Geissler (11) found, when subjects were first told to expect a sound from a particular quarter or half of the field and it actually came from an unexpected quarter or half, their errors increased from 30 per cent to 40 per cent in localizing it over their errors when the sound came fom the expected general direction. The subjects reported that they had either visually imagined the place or kinesthetically imagined pointing in the expected direction. In another case Ryan states ". . . that the visually perceived material of which an object is composed plays a measurable part in tactually judging the weight of the object" (34:694).

An investigation which illustrates more specifically the relationship between a sensory stimulus and a selective response was conducted by Usnadze (37). He presented six nonsense drawings to ten subjects and asked them to select appropriate names for these from a prepared list of 42 unfamiliar syllables or sound complexes. Only 68 per cent of the syllables were selected and from among them the percentage of correspondence of a particular syllable to a particular drawing was far greater than mere chance would allow.

Cowles (7) had two groups of subjects select seven pictures to correspond with seven phonograph recordings. One group based their choices on mood and the other on "fit." The results showed that 14 out of a possible 49 combinations were not made and that there was a fairly high degree of correspondence in the case of some of the recordings. There was practically no difference in the selections made by subjects trained in music and those not so trained. The reasons given for their selections disclosed that the represented content of pictures determined the choices to correspond with music having prominent dynamic characteristics. The terms used to describe both the music and the pictures were frequently very similar. Only rarely were line and color mentioned and few subjects mentioned mood except in regard to those recordings with less prominent, less changing dynamic characteristics.

Omwake (26) played repeated notes and scale passages in several types of directional arrangements to groups of school children while displaying orange lines on a black background simulating contours of the melodic lines. In all cases except one the melodic line was associated with the figure line following the same pattern. In this part of the study the relationship would seem too obvious to establish any significant conclusions. But a greater degree of selectivity was possible and the expected results less obvious when eight individual tones in different registers of the piano were played and the students named colors to correspond with these tones. A greater degree of consistency was found in the selections of students in the sixth grade and above than in grades four and five. The selections from low to high were black, blue, red, and yellow. Recordings of a lullaby, march, melancholy selection, and dance were played for comparison with colors, lines, pictures, and stick men. There was a considerable degree of consistency in all the comparisons except two.

The results of these studies permit the inference that there is a carry-over from a sensory stimulus to a selective response. But how about the carry-over from a sensory stimulus to a creative response? There is, as yet, no conclusive evidence that any relationship exists between the two.

CREATIVE THOUGHT

Much theorizing about creative thought, that thought through which new relations or fresh arrangements, frequently directed toward some goal, are brought into being, and the creative process, that course of procedure through which creative thought operates, has found its way into the literature but not many significant experimental investigations of either are on record. Hutchinson (21) has drawn together 152 items in this general area. A large portion of these are entirely theoretical. He reports (21: 393) that Wallas (38) has distinguished four stages of creative thought: preparation, incubation, illumination, and verification. A series of investigations was conducted by Patrick to check these thought stages in the creative thought in poets (28), the creative thought in artists (27), and in scientific thought (29). She had subjects repeat aloud all their thoughts while engaged in creative activity and used the record of these statements and the completed products as bases for her analyses. In all cases she found the stages distinguishable. In the latter experiment, however, the last stage was omitted because the subjects did not carry their undertakings to completion. The four stages may be generally defined as follows: preparation is that period in which there are many rapid thought changes and new ideas are received; incubation is that period in which there is no concentrated and frequently no conscious thought on the problem but an occasional recurrence of an idea with more or less modification; illumination is that period in which a definite plan is formulated, a brief flash of thought in which the idea that has been incubating becomes definitely related to a specific goal; and verification is that period in which the plan is elaborated, details added, and the entire work completed and verified. Many illustrations of the second and third stages of creative thought among scientists are recorded by Platt and Baker (30).

THE CREATIVE PROCESS IN MUSIC

Mursell (25:258-284) has synthesized most of the pertinent material in the area of the creative process in music. He states that the psychologist "... has knowledge enough of the conditions of that act (musical creation) to be sure that essentially what is going on is a *transposition of human feeling into a pattern of tone and rhythm.*" (25:260). Introspective experiments in musical composition have been conducted by Benham. (4). She wrote compositions herself taking notes about the preceding minute, about the writing of the idea, and about the manipulation of melodies as adding bar lines, etc. In some instances she drew curves to represent her feelings before writing the compositions. There was a close correspondence between the shapes of the lines and the shapes of the melodies. She observed that visual imagery was not present; auditory imagery was present but she could not determine whether it occurred before or during the composition act. It was strongest at the emergence of the idea. She also observed that there seemed to be a rhythmic feeling of rise and fall. Mood set, assuming physical poses and feeling, before composing definitely affected the composition work and sharpened the results. In her estimation this method of investigation may be developed but it requires practice.

A most significant experimental and historical investigation of the creative process in music was conducted by Bahle. (2). He asked composers to write songs to one of eight poems he included with his request or to some other poem of their own choosing. Each participant was to keep an accurate and detailed diary of all thoughts he had in regard to the composition until the song was begun. During the actual period of composing, no attention was to be paid to the psychological process but at the conclusion an account of the process, which should include the answers to certain questions, was to be written. This he termed a *Fernexperiment,* a type of experiment which would permit composition to take place under the most normal conditions possible. He received 27 compositions and reports, 18 based on his texts with the number to each being 8, 4, 3, 1, 1, 1. Two poems were not acceptable to any of the composers for purposes of a song. He states that contrary to opinion, the psychological side of musical composition has far more than expected similarity. What objectively shows itself abundantly as difference in worth, shows itself inwardly only as a difference of grade (2:15).

Three types of texts were found to be unsuitable for musical composition: 1. theoretical or intellectual, 2. those the composers could not live or feel again, and 3. those that referred directly to the personal feelings of the poet as religious, moral, world view, or as condition, style, or nature of character (2:23-4). Usable texts immediately affected the composers' emotions rather than their feelings. In smaller works the poems frequently had some connections with the composers' former experiences though the choices were neither consciously nor willfully made because of those connections. In larger vocal works text selections were usually affected by more enduring and intensive experiences, which might be concerning simple things of living. Of the two criteria for selecting texts, non-musical experiences seemed to be more important than musical elements. In a number of instances the poems brought forth mental pictures and the composers wrote to these pictures. Non-musical but artistically usable experiences, permitting the composer to submerge himself into the text, were of great importance. He mentioned, however, that music is always more than just an expression of experiences, it is a specific natured formation of expression taking into consideration the special laws of music (2:80). A composition might be a product of the wishing world of the composer in that depressing flashes of thought might produce gay melodies and vice versa.

He states that three forms of dynamic impulses which serve as ferment or work stimuli are: 1. Geophysical impulses as the physical chemistry of the body and nervous system, the culture, weather, and the time of the year or the day. These cause an increase in general psychological activity and therewith necessarily a stepping up of work. (2:138). 2. Rest, meditation, day dreaming, etc. serve to encourage inner concentration or organization. 3. The social reactive work impulses as comments, explanations, criticism, etc., bring about a kind of self improvement, an increased self-understanding and, hence, belief in ones self (2:182).

The experiments recounted throw some light on the creative process but do not disclose the source of illumination or inspiration, as it is more frequently called. Where does the musical idea come from? Copland offers an answer when he states that "The composer starts with his theme; and the theme is a gift from Heaven. He doesn't know where it comes from—has no control over it. It comes almost like automatic writing" (6:23). This answer may be quite satisfactory for the practicing composer and for the average layman, but the investigator looks further for an explanation.

A different answer is offered by Woodworth when he writes: "How does the musical composer, for example, free himself of all the familiar pieces and bring the notes into a fresh arrangement? All that he can say is usually that he had an 'inspiration'; the new air simply came to him. Now, of course, the air did not really come to him from outside; he made it himself, it was his reaction, but it was a quick, free reaction, of which he could observe little introspectively" (39:587). It is true that the composer has all the notes and brings them into a fresh arrangement but the answer is not quite as simple as that. A machine could be made which would do the same thing. Gordon states that "New shapes do not come out of nothing; each one has a history" (15:203). What is the history of the new shape? Why did the composer select a particular fresh arrangement? What influenced the composer to select a particular new shape from among the millions that were available to him? This last question leads directly to the principal problem of this study. Is there a carry-over from an abstract design to the resultant musical theme when the theme is composed to the design?

II. THE EXPERIMENT

GENERAL STATEMENT OF PROCEDURE

THE PROCEDURE employed in the study was as follows:

1. Four abstract designs were sent to a selected group of Standard composers and Popular composers with the request that each design should be studied for a few moments and in each case, immediately after the period of study, a theme should be composed. The themes were to be revised if the composers felt revision was necessary for a more adequate expression but both versions were to be submitted along with statements about the connections between the designs and the themes. The composers were also requested to submit whatever comments they cared to make concerning their mental processes during the period of writing.

2. The manuscripts of the themes received were displayed before an authority in the field of music composition. He examined them in groups according to the designs to which they were composed and then wrote brief comments about his observations.

3. Elements of the themes were catalogued. Only those elements which could be readily singled out were recorded. These were: Time Signature, Key and Mode, Tempo or Pace, Character Directions, Dynamics and Markings, and the Performing Medium for which each theme was conceived.

4. The themes were played in random order to expert auditors who checked them according to pre-established groups of characteristics under the headings of Tempo or Pace, Dynamics, Rhythmic Pattern, Melodic Pattern, and Mood or Character.

5. The themes were then played in random order to 20 auditors trained in music and 10 auditors untrained in music. These auditors associated the themes as they heard them with enlarged copies of the designs which were sent to the composers. At the conclusion of the hearing, the auditors were requested to write brief statements about the bases they used for making the associations.

6. Themes by 13 of the composers were played to a different group of ten auditors, some having and some not having musical training. The playing order for this hearing was according to composer, meaning the auditors were informed that the four themes played as a group were by one composer. Of course the order of the themes within each group was not disclosed. The procedure for these auditors was the same as that for the auditors mentioned in "5" above except that each group of four themes was repeated before continuing with the next group.

7. Themes to the designs were secured for purposes of analysis and comparison from 20 high school students.

DESIGNS

The use of pictures in connection with the study was given careful consideration. It brought forth the problem of the relationships between music and other forms of expression, particularly the graphic arts. One indication of the existence of a relationship between the two media was the use of music as a basis for four murals done by Schanker, Wicht, Browne, and Davis in 1939 for radio station WNYC. The terminology used in the description of these by Jewell (23) was very largely the same as that employed in music. "Symphonic," "tone," "interval," "counterpoint," and "fugue" found their way into Jewell's account of the artists' own comments about the products of their endeavors.

Another illustration of a relationship is found in the painting by Charles Sheeler called "Fugue, 1940." It was added to the collection of the Boston Museum of Fine Arts in the early part of 1941. Under a print of it appearing in The Home Forum of *The Christian Science Monitor* (10) is the statement, "Out of the component elements of a contemporary industrial theme with which we are all familiar, Sheeler has constructed a fugue with paint and canvas." This painting indicates clearly that the artist was not averse to using a form most familiar in music for his graphic presentation.

Evidences of the relationships are by no means limited to paintings. Music affords a ready supply of illustrations. Gilman reports in the *New York Philharmonic Notes* (14), "Respighi's four brief tone-poems, *Vetrate di Chiesa (Church Windows),* convey to us the images, visions, emotions, that were aroused in him as he sat in fancy or actuality in various Italian churches, with the light falling through stained-glass windows and patterning their figures upon his far-wandering imagination, reminding him of certain pictured legends, holy myths, recorded miracles, transilluminated by a Latin sun."

Liebling (24) states that each of the three orchestral movements in the symphonic excerpts from Hindemith's opera, *Mathis der Mahler,* was inspired by one of the Gruenewald panels in the triptych of the Isenheimer altar at Colmar, Germany. He mentions further that Beethoven wrote his *Pastoral Symphony* after contemplating the picture of nature and that Rachmaninoff translated Böcklin's masterpiece, "Die Toteninsel," into a compelling symphonic example.

A number of illustrations are recounted by Waldemar Rieck in two articles appearing in *Musical America.* In the first article (33) he states that "The Triumph of Death," attributed to Pietro and Ambrogio Lorenzetti, is said to have inspired *Die Totentanz* by Liszt; "Dombild" in the Chapel of St. Michael in Cologne Cathedral, painted by Stephen Lochner inspired the *March of the Three Kings* by the same composer; Raphael's "Sposalizio" ("The Marriage of the Virgin") served as a stimulus for Liszt's composition of the same name; another painting by Raphael in a chapel to St. Cecilia in the Church of San Giovanni del Monte, finished in 1516, and now hanging in the Gallery of Bologna inspired Liszt's cantata *Die Heilige Cacelia;* Liszt also composed his symphonic poem *Die Hunnenschlacht* to Kaulbach's painting bearing the same title; Böcklin's idyllic "Das Gefilde der Seligen" inspired Weingartner to compose his symphonic poem of the same name; "Hans Huber (1852-1921) in his *E Minor Symphony,* opus 115, has also based each movement on one or more of the paintings by this same artist (Böcklin), making a veritable picture gallery of symphonic music"; and "The Storm at The Isles of Shoals" by Brown was the inspiration for Paine's symphonic poem *An Island Fantasy.*

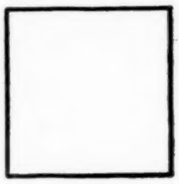
Rieck mentions in his second article (32) that the funeral painting by El Greco, "The Interment of Count Orgaz," was the source of inspiration for ballet music by the Swedish conductor and composer D. E. Ingelbrecht; da Vinci's "Mona Lisa" was the subject of Schillings' two-act triangle melodramatic musical tragedy *Mona Lisa;* the scenes as well as the ideas for the four principal characters in Granados' opera *Goyescas* were derived from the works of Goya; the sequence of Schwind's frescoes "Life of St. Elisabeth" gave Liszt his cue for the oratorio *St. Elisabeth;* and the opera *Melusine* by Grammann is based on Schwind's cycle of ten paintings which decorate the walls of the Wien K.K. Hofmuseum. This array of illustrations definitely indicates a relationship existent between music and the graphic arts.

Another type of illustration, showing how the composer reaches beyond the realm of pure tone for his compositions, was mentioned in a letter to the experimenter from Olin Downes. He stated that Hector Villa Lobos, a South American composer, wrote a composition which was suggested in its melodic form by the outline of the skyline of New York City.

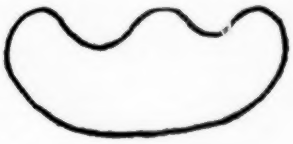
Unquestionably a study using a picture as the stimulus for composers could very well be conducted, but it was observed in Patrick's report of *Creative Thought in Poets* (28), in which a picture was used as a stimulus, that a poet very frequently picked out a certain portion of the picture as the basis for his poem but by no means did all poets use the same portion. This led the experimenter to believe that composers might use the same procedure as the poets thereby making a comparison of the composers' works in regard to the stimulus exceedingly difficult if not impossible. In order to avoid this difficulty, abstract designs of a geometric nature, as illustrated, were used.

The only criterion used for the designs was that each should be different from the others. Any other four designs would have been considered equally suitable if they met this criterion. No effort whatsoever was made to determine whether or not they would be regarded as "aesthetically stimulating," "having emotional content," or embodying any other characteristics which might be attributed to designs. The idea was not to limit the study in that way; designs in general were under consideration and not any particular group of designs.

Design A



Design B



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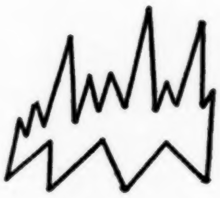

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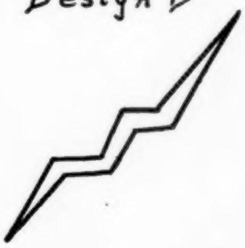

COMPOSERS

The composers who participated in the experiment were considered as belonging to two groups, Standard composers and Popular composers. Those composers who most frequently wrote music of the type that is generally performed by dance orchestras were taken to be Popular composers. The others were taken to be Standard composers. The classifications used were approximately the same as those used by the American Society for Composers, Authors and Publishers except that the group considered by them as Production composers was included with the group called Popular composers in this study. The distinction, in the case of a number of individual composers, was difficult to make because they wrote popular songs or music for stage productions as well as compositions for symphonic ensembles. In those cases, as well as could be ascertained, the composers were included in the group with which they were most frequently identified.

In the selection of the Standard composers, a card file was first made which included the names of those composers whose works were reported to have been performed by major organizations, ensembles, or soloists throughout the country during the concert seasons of 1938-39 and 1939-40. "The New York Times" and the "New York Herald Tribune" were the principal sources of this information. The names of other composers, whose works the experimenter knew were quite frequently performed, were also added to the file. The cards were then checked with Thompson's *Cyclopedia* (35), and Reis' *Composers in America* (31), and Ewen's *Composers of Today* (9) to ascertain that each composer had produced a considerable number of works. From this card file a list of 224 names was compiled. This list was presented to three authorities with the request that each check a group of composers who could be considered as representative of contemporary composers. One of the authorities mentioned that the entire list was very acceptable and that his selection of a representative group was made merely for the purposes of the study.

The Popular composers who were approached in this study were selected from a rather comprehensive list of Popular composers who have had a considerable number of works published. The selections were made by two persons who were well acquainted with this group of composers and their works.

DIRECTIONS SENT TO THE COMPOSERS

Before sending the experimental material to the composers selected for the study, a copy of the instruction sheet which was to be included was sent to two other composers. These two composers were requested to follow the instructions and return themes. The purpose of this procedure was to ascertain that the instruction sheet conveyed the intended information. After this preliminary study, the following instruction sheet was adopted:

INSTRUCTION SHEET

1. Study design__________for a few moments.
2. Improvise or write a phrase, period, or theme IMMEDIATELY after this study. This need be only long enough to suggest the idea. Only a theme is requested since that portion of the musical expression contains the fundamental concept of a musical composition. It is preferable that it be for the piano but it may be for any instrument or combination of instruments according to your own desires. You may use any harmonic background and style of accompaniment you prefer. The idea is not to try to depict the shape formally or geometrically in music but to write what you desire after studying the shape.
3. Should you desire to make some change in the theme after the first draft, please rewrite it and include both the first draft which should be written immediately after the design has been studied, and the final draft which may be made at any later time. In fact, both an original and a revised theme would be preferable if you find that the revision is necessary for a more adequate expression.
4. Immediately after completing the theme, state what connections, if any, exist between the design and the music. This statement may be as brief or as comprehensive as you care to make it.

5. Follow out the same procedure for the remaining designs in the following order____________________. It would be better if these were not done in immediate succession. Mark each theme with date and hour of its completion.
6. Please edit the themes as to tempo marks, phrasing, slurs, dynamics, etc., so that the musical ideas may be clearly intelligible. It is very important to indicate whether notes are to be played staccato or legato. Be sure to label each theme as to the design for which it is intended and whether it is the first draft or the revised theme.
7. Any comments you may desire to make concerning your mental processes during the period of writing these themes will be of great assistance.
8. The receipt of the completed material by the experimenter within a month will be greatly appreciated, however it is desirable that the revised themes be the result of your normal working procedures and if a longer time be required, do not hesitate to take this time.

The letter names of the designs were written into the instruction sheet in ink. A different order for studying the designs and composing themes was given in each sheet until the 24 possible orders had all been indicated. Then the sequence was followed out again for the next 24 sheets and so on for all the sheets used in the study. This procedure was deemed advisable in order to eliminate any consistent influence that the same order of presenting the designs might have on the resultant themes.

Included with the letter of request to each composer was a copy of the instruction sheet, a copy of each design placed in a small manila coin envelope on which was printed "Read Instructions Before Opening. DESIGN (the letter name of the design)," a sheet of music manuscript paper, and a stamped return envelope.

RETURNS FROM COMPOSERS

Themes were received from 22 Standard composers and 10 Popular composers. Twenty Standard composers submitted themes to all the designs, one submitted themes to Designs B, C, and D, and one submitted a theme to Design A only. Nine of the Popular composers submitted themes to all the designs and one submitted themes to Designs B, C, and D. Several composers submitted both first drafts and revised versions of their themes. The first drafts of all of the themes were used for experimental purposes because all composers submitted first drafts. It should be mentioned that those who submitted revised versions seemed generally to sharpen the effects of their original themes by the revisions; that is, a generally smooth theme was made still more smooth or a restless theme still more restless. A large portion of both Standard and Popular composers included statements as to the connections between the designs and their themes. A number of them made further statements concerning their mental processes during the period of writing and some gave information about their usual working procedures. Several composers who did not contribute themes to the study sent accounts of their reactions to composing music to designs and contributed statements about their usual working procedures.

INSPECTION OF THEMES

The manuscripts of the themes received were displayed before an authority in the field of music composition. He examined them in groups according to the designs to which they were composed and then wrote brief comments about his observations of the characteristics that seemed generally to be predominant in each group. He did not play the themes nor were they played to him. His comments were based entirely on an inspection of the themes from sight.

METHOD OF CATALOGUING ELEMENTS OF THEMES

Elements of the themes were catalogued and kept separate according to designs to which the themes were composed. Subdivisions of these were made according to Standard composers and Popular composers. Only those elements which could be readily singled out were recorded. These were: Time Signature, Key and Mode, Tempo or Pace, Character Directions, Dynamics and Markings, and the Performing Medium for which each theme was conceived. The first three and the fifth elements mentioned are self explanatory. Under Character Directions were included whatever statements were made about the characters of the respective themes or the styles in which they were to be played. Illustrations of these are: "legatissimo," "dolce," "deciso," "vigorously," and "bright." The performing medium was considered to be the piano when no special medium was mentioned since the directions indicated that the piano was the preferred medium.

In addition to the elements, the connections between the themes and their respective designs were recorded. These connections were ascertained from the statements made by the composers.

ORDERS OF PLAYING THEMES

A random order of playing the themes was used throughout most of the experiment. To establish this order, a card about 1″ x ½″ was made for each theme and on it were written the composer's name and the letter name of the design to which the theme was composed. These cards were mixed in a container as in a lottery and the order in which they were drawn was the playing order established for the themes.

During a preliminary playing of the themes to two auditors for the purpose of establishing the procedure to be used during the experiment, it was ascertained that auditors needed to become familiar with the process of associating themes and designs before the results obtained from auditors could be relied upon. Since the themes by composers who did not submit themes to all the designs were not to be used in the statistical treatment of the experiment for associating themes and designs, it was decided to use that group at the beginning of the random playing to familiarize the auditors with this particular associative process. Four other themes by one composer which were least adapted for performance on the piano were added to this group making a total of eleven themes which were to be considered as a pre-hearing. They, of course, were arranged in random order. The random orders for the Standard composers' themes and the Popular composers' themes were established separately. The former group, followed by the latter, was placed immediately after the themes used for the pre-hearing.

A number of the auditors mentioned at the conclusion of the playing in random order that the quietness or restlessness of the themes influenced to some extent the design selections they made. If a composer generally wrote music of a quiet character or of a restless character, his themes, when played along with all the other themes, might very easily all be associated with only one or two of the designs. Most of the auditors did select only one or two designs for all of the themes by a number of composers during the playing in random order. For that reason it was deemed advisable to play according to composer the themes by those composers and by several others selected at random.

To establish this latter playing order, the names of the composers whose themes were to be used in this playing were listed. Cards similar to those used in establishing the random order were made and the 24 possible orders of the design letter names were written on them. These cards, after being thoroughly mixed in a container, were drawn one at a time. The order appearing on the first card was adopted for the themes by the composer whose name was at the top of the list. The second card established the order for the second composer's themes, and so on until the playing order for each composer's themes was established. No pre-hearing for this group of auditors was deemed necessary since the four themes by each composer were to be played twice before the auditors were to make their final design selections.

PIANIST

The same pianist played the themes at all hearings. She was recommended by an authority who was acquainted with the details of the experiment, the difficulty of the themes, and with her ability as a performer. She spent much time familiarizing herself with each theme from both the standpoints of technic and interpretation. Her performance was checked against the manuscripts of the themes before she played for any of the auditors. During the hearings she employed the time interval immediately preceding the actual playing of each theme with several mental rehearsals and simulated performances of it in order to do away as much as possible with any persistence of the former theme in her feelings. This also enabled her to enter immediately into the spirit of the new theme. From a check on her performance by using the responses of the expert auditors it was ascertained that she gave a very acceptable rendition of each theme. At each playing the experimenter observed carefully that the same standard of performance was maintained.

EXPERT AUDITORS AND DIRECTIONS GIVEN TO THEM

Two expert auditors were secured to check the themes according to certain pre-established groups of characteristics. These auditors were selected because they had spent a considerable portion of each day for the past several years in the analysis of music by listening to it. The groups of characteristics with subdivisions under each were: TEMPO OR PACE, Slow, Moderate, Fast; DYNAMICS, Soft, Medium, Loud, Accented, Climactic; RHYTHMIC PATTERN, Duple Effect, Triple Effect, Syncopated; MELODIC PATTERN, Even, Jagged, Rising and/or Falling; MOOD OR CHARACTER, Quiet, Decisive, Restless. Nearly all of these terms are self-explanatory. Regarding Rhythmic Pattern it should be mentioned as an illustration that a theme in 6/8 meter or one having triplet subdivisions of beats was checked as having both a duple effect and a triple effect since the auditors were permitted to check as many characteristics for each theme as they felt necessary. Neither of the auditors was acquainted with the details of the study or with the designs, and the designs were not displayed to them before they had completed their part in the experiment. The themes were played for them in random order and they responded quickly and almost spontaneously. All the themes were used during this hearing and were given equal weight in the experiment since these auditors needed no pre-hearing in order to familiarize themselves with the process. The setting in which the hearing took place was a large classroom familiar to both auditors.

The expert auditors were asked to check what they heard in the themes on the bases of pre-established groups of characteristics rather than to give free responses as to what they heard in the themes because it was observed from the results of the preliminary playing to establish the procedure that a single auditor might make conflicting statements about the same theme. To illustrate, one auditor referred to a single theme as being both vague and definite. The characteristics selected for use in the hearing by the expert auditors were established by summarizing the free responses of the auditors in the preliminary hearing and using those characteristics which seemed best to set forth the distinguishing elements heard in themes.

OTHER AUDITORS AND DIRECTIONS GIVEN TO THEM

All auditors except the two mentioned in the preceding section were graduate students or, in several cases, wives of graduate students. Twenty auditors who were trained in music and ten who were not so trained were used at the hearings when the themes were played in random order. Of the twenty musically trained auditors, seven had from 1 to 4 years training, six from 5 to 9 years, and seven from 10 to 20 years. It was necessary to hold three hearings in order to secure the thirty auditors. One hearing took place in a small auditorium and the other two in large classrooms. The settings were familiar to all who took part. The designs used at the hearings were 5¼ times the size of those used by the composers and were attached to the wall in front of the room.

The auditors were informed that each theme they were about to hear was written by a composer after he had studied a small version of one of the designs which appeared on the wall before them. They were shown copies of the small designs used by the composers. They were informed further that the themes would be played in random order which meant there was no way of ascertaining from the order either the composer who wrote a particular theme or the design to which it was written. Each theme as it was played was to be associated with one of the designs. The only criterion for the association was to be the auditor's own feelings after he heard the theme and viewed the designs. The association was to be indicated by placing the letter name of the design selected in a space provided for that purpose on a check list. Each theme was to be played only once unless an auditor requested a second hearing. Very few second hearings were requested during the entire experiment.

An interval of silence about one half minute in length separated the themes. The auditors were not permitted to converse with each other about their selections during the course of the experiment. They were asked, after six themes had been played, whether or not the time interval between themes was adequate for making what they felt to be satisfactory selections. The half minute period was found to be quite adequate. After about half the themes had been played, the auditors were given a rest period of five minutes. They were not informed as to whether they were listening to a Standard or a Popular composer's theme but they were informed of the intended performing medium for each theme. At the conclusion of the hearings the auditors were asked to write briefly on their check lists the bases they used for making the associations. The check lists from all auditors were used in tabulating the results even though several of them revealed that the auditors represented by them selected one or two of the designs relatively few times to correspond with any of the themes. This was considered advisable since it is not possible to select auditors according to their preferences, likes, or dislikes at performances of compositions.

Ten auditors participated in the hearing of themes played according to composer. The musical training of this group was as follows: one had no years, three had 2 to 3 years, three had 9 to 14 years, and three had 15 to 20 years. Their check lists were not kept separate in the tabulation of results. The setting for this hearing was a large classroom with which all were familiar. The directions given to these auditors were similar to those given the preceding ones except that they were informed each group of four themes was by one composer and that each of the four themes was composed to one of the four designs. The procedure for these auditors differed from that followed by the preceding ones in that the four themes by one composer were played in succession and were then repeated in the same order to permit the auditors to make any desired changes in their selections. This procedure was completed for the themes by one composer before continuing with the themes by the next composer. These auditors were also requested at the conclusion of the hearing to write on their check lists the bases they used for determining their selections.

HIGH SCHOOL STUDENTS AND DIRECTIONS GIVEN TO THEM

Themes to the designs were secured for purposes of analysis and comparison from 20 high school students. All students were from one school. Nine boys and 11 girls participated. Their age range was from 14 to 19 years inclusive; the average age was 16.25 years with a standard deviation of 1.09 years. Two were from grade 10, twelve from grade 11, and six from grade 12. Their I.Q.'s according to the personnel records in the school, based on the scores they made on the Henmon-Nelson Test, Form B, ranged from 95-142 with an average of 114 and a standard deviation of 10.7. All students had had some general class instruction in music ranging from one to ten years, the majority having had 8 years of this kind of Public School Music instruction. Eleven had received private instruction on some instrument, six on the piano, two on the violin, one on the saxophone, one on the bass violin, and one on the mandolin. One boy played drums but had received no instruction on the instrument. One of this group had had a half year training, two—1 year, two—2 years, one—4 years, four—5 years, and one—7 years, but none had received any training in music composition, improvisation, or what is known in school as creative music.

The students were interviewed individually in a small room containing a piano. Each one was informed that he was being approached to assist in an experiment. He was told that he was to respond by means of a musical theme or a short melody to each of four designs which would be shown him one at a time, that there were no preferred answers, that his responses had nothing whatsoever to do with the marks he would receive for his school work, that he was not being examined by means of a test, and that whatever responses he gave were "right." The order in which the designs were presented was different for each student. The themes were to be hummed or played on the piano but nearly all students preferred humming. Each theme was recorded on manuscript paper by the experimenter and then played on the piano for verification by the student before proceeding to the next design. Frequently a wrong note was played to check whether or not the student had made a definite response. In each case the student remarked about the wrong note and insisted that it be corrected. Whatever remarks the student made about the designs or his themes were also recorded. Information about the student's musical training was secured from him at the end of the interview.

III. The Findings

STATEMENTS ABOUT THE THEMES

An authority in music and the teaching of music composition inspected the themes and made the following statements about those composed to each design:

To Design A:

"This music is in a slow, even tempo, predominately duple or quadruple, having poise and expressing calmness and decision."

To Design B:

"Moderate to slow tempo in triple meter or with triplet subdivisions giving a smooth flowing effect."

To Design C:

"Vigorous, agitated mood characterized frequently by dissonance and (upward) skips (7th) giving a jagged melodic effect. More duple and quadruple than triple meters."

To Design D:

"Rapid, decisive, impetuous tempi in duple or quadruple meters. Generally rising climactic passages with wide dynamic range (from very soft to very loud)."

These statements were made from sight of the manuscripts. The authority did not hear the actual performance of any of the themes. None of the statements was intended to apply without exception to all of the themes composed to the respective designs but rather to express the characteristics which seemed generally to be predominant in the music written to Designs A, B, C, and D.

OBSERVATIONS ABOUT THE THEMES

More detailed observations reveal more specifically something about the characteristics found in the themes to the respective designs. The order in which the themes appear in Appendix B facilitates the observations.

Design A

Standard Composers. The themes composed to Design A by the Standard composers range from a single tone held for 220 seconds to extremely complex configurations but the latter are decidedly in the minority. The first measure or two, which give the auditor his initial impression, show a striking amount of firmness, eveness, regularity, and deliberateness. More than half of these measures consist of either two half notes, half and two quarters, or four quarters.

The particular melodic characteristics of initial skips and initial repeated notes deserve attention. Themes XVIII-A-2 and VI-A-3 both begin on Middle C with a half note and skip up an octave to another half note. One is the beginning of a canon, the other a fugue. Others having a relatively wide initial upward skip are XI-A-8, XVII-A-11, III-A-12, I-A-15, XII-A-17, and XV-A-18. Theme VII-A-20 has an initial upward skip of two octaves somewhat obscured by an intervening arpeggio. Themes XX-A-9 and XIX-A-10 begin with the skip down instead of up. Repeated notes at the beginning are not uncommon as observed in Themes XIV-A-5, XVI-A-7, IX-A-14, and II-A-16. These two melodic characteristics are present in more than half of this group of themes.

Popular Composers. The same general observations about firmness, evenness, regularity, and deliberateness hold for the Popular composers' Design A themes as well as for those by the Standard composers. Whole, half, and quarter notes make up the first measures of two-thirds of the themes. Themes XXVII-A-4, XXV-A-5 and XXVI-A-9 begin with a downward skip and Theme XXIX-A-3 skips in the opposite direction. Repeated notes at the beginning are present in Themes XXX-A-2 and XXIV-A-7. The latter seems to combine the idea of repeated notes and upward skip by repeating the preparatory F before skipping to the B♭ on the strong beat.

Two comparisons between particular themes by Standard and Popular composers bear special attention. The opening upward skip of an octave in Themes XVIII-A-2 and VI-A-3 is given in inverted form and syncopated in Theme XXVI-A-9. Themes XVII-A-11 and XXV-A-5 follow a very similar rhythmic pattern and seem in general to be inversions of each other.

Design B

Standard Composers. An inspection of the themes composed by Standard composers to Design B reveals that nearly all tend to be quiet, smooth, and marked by slurs. Not one begins with repeated notes but eleven of them move away from the first note by a step or a third and then return either by a step or a third. Fifteen of the themes are either in triple meter or employ triplets while Theme XVI-B-11 approaches that rhythmic effect. Although II-B-1 and I-B-2 are quite different in pace, they disclose a striking similarity in melodic pattern. The number of eighth notes employed in a majority of the themes is also worthy of attention. Themes XV-B-20 and IV-B-21 deviate from the others in this latter respect but their opening melodic patterns in sixteenths assume the same general shape.

Popular Composers. Quietness, smoothness, and slurs are also strongly in evidence in the Popular composers' themes to Design B. Only Theme XXXII-B-8 opens with repeated notes in the upper voice, but the melodic motion of its second voice and the motion of its bass line largely obliterate the effect of the repeated notes. The opening motion stepwise or in thirds is present to some extent in this group of themes but not as consistently as in those by the Standard composers. Eighth notes are used to a considerable extent but again not as much as in the Standard composers' themes to this design. Theme XXV-B-10, as Themes XV-B-20 and IV-B-21, employs a continuous stream of sixteenths but in a different shape than in the other two themes. In eight of the ten Popular composers' themes in this group, the direction of the second note with respect to the first is up while in the Standard composer themes only nine out of 21 take this initial direction.

Design C

Standard Composers. The most evident single characteristic of the Standard composers' themes to Design C is agitation. This is indicated by much skipping up and down of the melodic line and unevenness of rhythm. Quite a large majority of them begin with skips up from short to long notes or with various other patterns of syncopation. Eight of them begin with rests either in their upper or lower voices. Nearly every theme is marked with short, staccato, or accented notes and many of the accents are off the beats. Of the remainder, all except two contain quite sudden dynamic changes and one of these is heavy and syncopated. Theme X-C-21, while soft and legato, is quite complex in its contrapuntal structure since it employs a different rhythmic pattern for each of its four voices. Of particular interest is a statement made by one of the auditors that Theme XXI-C-2 gave the general impression of being a slow version of Theme II-C-1.

Popular Composers. About half of the Design C themes by the Popular composers have characteristics similar to those by the Standard composers. In four of these one or more voices begin after another voice. Short, staccato, or accented notes are quite prevalent in six of them. This particular group contains a larger percentage of themes comparable with those composed to other designs than any other group. The explanations for these deviations from the general pattern of the group appear later in the study.

Design D

Standard Composers. A flow of notes up or down or a building up, "getting somewhere," is the general characteristic present in nearly all of the Standard composers' themes to Design D. This is so apparent from an inspection of them that no further generalizations about the whole group need be made. Unique similarities of specific themes are worthy of special attention. Themes XVIII-D-5 and XI-D-6 have very short notes on the beats and skip to longer notes off the beats rather like exaggerated syncopation. But the uniqueness is that each short note following a long one begins only a half step from it in the direction of the original skip although one theme ascends and the other descends. The use of this very unusual device in composition by two composers residing across the continent from each other is worthy of contemplation. Themes XIX-D-7, I-D-8, and XII-D-9 are unique in that they are each made up of two melodic lines though XIX-D-7 descends while the others ascend. Themes XVI-D-12 and XVII-D-13 build up during their first few measures to a high point both in melody and in dynamics and then drop suddenly more than an octave in pitch and to "f" in dynamics. Themes XXII-D-14 and VII-D-15 begin softly and relatively low, gradually build up in pitch and dynamics toward the middle, and then become softer and softer as they continue up in pitch. Theme VI-D-11 shows that Design D is depicted almost literally by the direction of the notes in a short motive. The motive is repeated in different registers, each overlapping the previous one, and the entire structure builds up to a very definite climax.

Popular Composers. The outstanding characteristic of the Popular composers' Design D themes is the same as that for the Standard composers' Design D themes and equally as evident from an inspection. Theme XXXII-D-3 produces the effect of building up by what might best be described as the "piling up of tone." Theme XXIII-D-8 illustrates this same device though it is spread out over a longer period of time. This effect is unique with the Popular composers' themes. Theme XXXI-D-6, while not beginning as low as Themes XXII-D-14 and VII-D-15, generally follows their pattern in that it gradually builds up over a fairly long period of time and then continues upward in pitch while getting softer to the end. Theme XXVI-D-7 presents a general pattern somewhat similar to Theme XXXI-D-6 except that toward the end, instead of ascending, the motion is descending chromatically in all four voices to a soft ending.

The Themes in General

The foregoing account shows that the themes, as they appear in notation, reveal characteristics according to the designs to which they were written and that these characteristics are quite distinct and different from each other. There is generally no difference between the characteristics outstanding in the Standard composers' themes and those in the Popular composers' themes to the same design. The characteristics are not present in every theme to each design without exception but they are certainly present to a great enough degree to lead one to believe that the designs had some influence in determining the characteristics.

ELEMENTS OF THE THEMES

The themes bear a more careful investigation than just a general inspection or observations about the characteristics that appear to be evident from a study of their notation. For that reason elements of the themes were catalogued and grouped according to designs and these groupings redivided according to Standard composers and Popular composers.

Design A

Standard Composers. The catalog of the elements of the Standard composers' themes to Design A showed that 16 of the themes were in 4/4 or C time, two in 2/4 or ₵ time, one in 5/4 and two had different signatures for different measures with duple meter predominating. Nine of the themes were taken to be in the key of C Major but the others were in such a variety of keys that no definite pattern could be established for them. According to the composers' markings of the tempo or pace for their respective themes, 18 of the 21 were Moderato or slower with most of these quite slow or very slow. Only about half of the composers wrote any directions at the beginnings of their themes other than tempo directions to indicate to the performer the character of their respective themes or the style in which each was to be played. Of those who gave this additional information, 6 used terms which implied that their themes should be "marked" or decisive, 3 mentioned "legato," 1 "Gracefully," and 1 "Calmo e solenne." Ten of the themes were marked "f" in dynamics, 3 "mf," 7 "mp" or softer, and 1 was very irregular in respect to dynamics. All themes that were not especially designated for a particular performing medium were presumed to be intended for the piano since the request to the composers indicated that the piano was the preferred medium for the experimental themes. The catalog showed that 13 of these themes were for the piano; 1 for clarinet; 1 for Hammond organ, fundamental without overtones; 1 for xylophone, cymbal, and three trumpets; 1 for string orchestra and harp; 1 for strings and woodwinds; 2 for orchestra; and 1 for four treble voices.

Popular Composers. Duple meter was as predominant for the Popular composers' themes to Design A as those by the Standard composers. No key consistency existed for these themes since each one was written in a different key. All except one, however, was in the Major mode. Over half of these themes were moderate or slower in tempo and the proportion was the same for character directions indicating decisiveness. The Popular composers did not give the dynamic markings of many of their themes. From an inspection of their music it could be established that nearly all were intended to be "mf" or louder with only one actually marked "p." All of these themes were taken to be for the piano.

Design B

Standard Composers. Triple or triplet effects were predominant in 15 of the 21 Standard composers' themes to Design B according to their time signatures. No pattern for key or mode could be established for these themes. The range of tempi was from "slow" to "vivace" with a strong clustering around Moderato. Not a single one of the character directions differed to any appreciable extent from "Calmly express," "Serenely Flowing," or "Grazioso dolce." The dynamic markings of fifteen of the themes were "mp" or softer. Two were marked "mf" and only one each "f" and "ff." Fourteen of the themes were for the piano, 1 for violin and piano, 1 for clarinet, 1 for oboe, 1 for flute and harp, 1 for B♭ clarinet, E♭ saxophone and trombone, and 2 for strings.

Popular Composers. The Popular composers wrote a majority of their themes in meters indicating triple or triplet effects. There was again no pattern established for the keys in which their themes were written although eight of the ten were in the Major mode. The tempo range for this group of themes was from "Molto lento" to "Allegretto" with a tendency toward the slower pace. The character directions were similar to those for the Standard composers' themes to Design B and not a single theme was marked to be as loud as "mf." All were for the piano.

Design C

Standard Composers. The time signatures of the Standard composers' themes to Design C indicated a fair predominance of duple meter but there were more irregularities and more triple meter signatures among them than among the Standard composers' Design A themes. In over half of these Design C themes no definite key or mode could be established and there was no key consistency for the remainder. The tempi for these themes ranged from "Largo" to "Presto" but the majority tended to be fast. By far the greater portion of the character directions indicated brightness, vigorousness, and agitation and very few of the dynamic markings indicated softness. Nearly all of the themes were strongly marked with accents or quick dynamic changes to a greater volume. Sixteen were for the piano, 1 for the piccolo, 1 for horns, 1 for heavy brass, 1 for string quartet, and 1 for orchestra.

Popular Composers. The Popular composers wrote four of their themes in 4/4 or C time, three in 3/4, two in 6/8, and one in 7/8. No consistency in the keys used was revealed but the Major mode was unanimously preferred. Three of the themes were slow in tempo, 2 were in waltz tempo, and the others were lively. The character directions ranged quite widely from theme to theme with no definite pattern establishable although five of them were quite similar to those used in the Standard composers' themes. Dynamic markings were about equally divided between soft and loud and between slurs and accents. All were for the piano.

Design D

Standard Composers. The Standard composers preferred time signatures which indicated duple meter for the larger portion of their themes to Design D but by no means were triple meter or triplet effects avoided. The key and mode of most of these themes could not be established. Sixteen of them were faster than Moderato with extremely fast tempi prevailing. Furiousness, impetuousness or decisiveness generally distinguished nearly all of their character directions. The dynamic markings of the beginnings of the themes ranged from very soft to very loud with somewhat of a tendency toward loudness. In the large majority of the cases these markings were followed with crescendos and in two of these the themes ended in decrescendos. Eleven themes were composed for the piano, 1 for violin, 1 for flute or violin, 1 for two flutes, 1 for two clarinets, 1 for trumpet, 1 for double bass and tuba, 2 for strings, and 2 for orchestra.

Popular Composers. Only two Popular composers selected a time signature of triple meter for their Design D themes; the remainder used a duple time signature. The key signatures for this group of themes did not follow any particular pattern although there seemed to be some preference for the Major mode. All except one of the themes were quite fast or very fast. The character directions pertained to the sweeping or furious character of the themes. The dynamics of this group were generally the same as those of the Standard composers' themes to Design D. All were for the piano.

General Remarks

The foregoing summary of the elements found in the themes shows that generally there was not a great deal of difference between the trends in these elements for the Standard composers' themes and the Popular composers' themes. Differences were more noticeable according to the designs to which the themes were written rather than according to composer groups. Several differences were recognizable, however, between the composer groups. (a) The Popular composers showed a decided preference for the Major mode while the Standard composers more frequently wrote atonally or in such a way that definite keys could not be established from the brief themes. (b) The Popular composers did not show quite the same consistency as the Standard composers in the character directions, dynamic markings, or tempo indications for Design C themes. (c) A number of the Standard composers indicated various media other than the piano for their themes while the Popular composers did not give such indications. It is quite possible that most of the composers did not mention any specific performing medium because the original request stated that the piano was preferable.

Different elements stood out quite strongly in the groups of themes to the various designs. Triple meter was used more frequently for Design B themes than for any others. The key of C Major was used by nine Standard composers for their themes to Design A while no other key trend was in evidence. One rather unique treatment of the element of key was observed in the themes by Composer XXIX. He used the letter name of each design as the key of the theme composed to it. The prevailing tempi for the themes were moderate or slow for Design A, moderate for Design B, somewhat faster for Design C and quite fast for Design D. The prevailing character directions for the themes indicated mostly decisiveness for Design A; smoothness, quietness and a flowing character for Design B; brightness, vigorousness and agitation for Design C; and a furious, impetuous or decisive character for Design D. Dynamic markings for the themes tended to be loud for Design A; quite soft for Design B; mostly loud and accented with quick dynamic changes for Design C; and generally loud with marked crescendos for Design D. The performing media, when indicated for the Design A themes, were quite varied with a tendency toward ensembles which would seem to be the preferred media for music of a rather decisive character. The Design B themes were written mostly for lighter toned instruments, and Design C themes were intended largely for those instruments with piercing or penetrating tones. Out of a wide variety of performing media for the Design D themes, all except one were for such instruments or combinations of instruments which could be considered as being adaptable to fast performance.

TABLE 1

Percentage of themes which displayed a given characteristic as heard by expert auditors

	Standard composer themes				Popular composer themes			
Characteristic	Design A	Design B	Design C	Design D	Design A	Design B	Design C	Design D
Tempo or Pace								
Slow	19.0*	7.1	7.1	14.3	27.8	25.0	30.0*	5.0
Moderate	71.4†	83.3*†	66.6†	47.6	72.2†	80.0*†	75.0†	65.0†
Fast	14.3	16.7	47.6	52.4*†	11.1	15.0	20.0	45.0*
Dynamics								
Soft	16.7	66.6*†	14.3	16.7	11.1	65.0*†	35.0	10.0
Medium	23.8*	23.8*	11.9	11.9	55.6*†	25.0	25.0	35.0
Loud	42.8†	11.9	52.4*†	38.1†	22.2	5.0	40.0†	45.0*†
Accented	11.9	2.4	35.7*	23.8	27.8*	10.0	25.0	20.0
Climactic	9.5	.0	19.0	23.8*	.0	.0	.0	35.0*
Rhythmic Pattern								
Duple	83.3*†	71.4†	83.3*†	64.3†	100.0*†	95.0†	90.0†	80.0†
Triple	14.3	59.5*	19.0	40.5	33.3	60.0*	45.0	55.0
Syncopated	11.9	11.9	26.2*	26.2*	5.6	5.0	10.0*	5.0
Melodic Pattern								
Even	64.3†	76.2*†	35.7	38.1	100.0*†	90.0†	90.0†	55.0†
Jagged	26.2	7.1	50.0*†	28.6	.0	.0	.0	20.0*
Rising and/or Falling	7.1	23.8	35.7	57.1*†	22.2	15.0	20.0	55.0*†
Mood or Character								
Quiet	28.6	78.5*	16.7	26.2	61.1†	85.0*†	55.0†	40.0
Decisive	66.6*†	16.7	42.8†	45.2†	50.0	10.0	45.0	60.0*†
Restless	7.1	9.5	40.5	42.8*	.0	5.0	20.0	35.0*

Note: Total percentage for each group of characteristics under each category exceeds 100 because auditors frequently checked more than one characteristic in each group for a single theme.

* Predominant characteristic in each group of categories.

† Predominant characteristic of each group of characteristics in each category.

CHARACTERISTICS HEARD IN THE THEMES BY EXPERT AUDITORS

A check on the observations about the themes and the elements catalogued from the themes is provided by the responses of the expert auditors. These responses were summarized for each characteristic according to the themes composed to each design (referred to in this section as a category) by Standard composers and by Popular composers. This summary appears in Table 1. The results are given in per cent in order to facilitate comparisons between various items of the table. The percentage total of each group of characteristics for each category of the table exceeds 100 because the auditors frequently checked more than one characteristic under each group of characteristics for a single theme.

An asterisk in the table indicates the category for each group of composers in which a particular characteristic was present to the greatest degree. As an illustration, the Standard composers' Design A themes were given a greater proportion of the expert auditors' Slow marks than were attributed to any other category of themes by the same composers. As a further illustration, more of the Design B themes by the Popular composers were taken to be soft than were the themes to any other design by that group of composers. A dagger indicates the outstanding characteristic of a particular group of characteristics for each category. As an illustration, more of the Standard composers' Design A themes were taken to be moderate in tempo than were taken to be either slow or fast.

The Standard composer themes to Design A, when considered on the basis of the expert auditors' responses, were predominantly moderate to slow in tempo, loud to medium in dynamics, duple in rhythmic pattern, and decisive in mood or character. Their themes to Design B were predominantly moderate in tempo, soft to medium in dynamics, duple and triple in rhythmic pattern, even in melodic pattern, and quiet in mood or character. Their Design C themes were generally moderate with some tendency toward fastness in tempo, loud and accented in dynamics, duple and syncopated in rhythmic pattern, and quite decisive and restless in mood or character. The Design D themes by this group of composers were most frequently fast with some tendency toward moderateness in tempo, somewhat loud and fairly accented and climactic in dynamics, mostly duple but quite frequently triple and somewhat syncopated in rhythmic pattern, principally rising and/or falling in melodic pattern, and decisive and restless in mood or character.

The Popular composers' themes, when considered on the basis of the expert auditors' responses, were quite similar to those by the Standard composers in many characteristics but enough differences were evident to warrant a separate examination. Their themes to Design A were principally moderate with some tendency to being slow in tempo, medium and somewhat accented in dynamics, duple in rhythmic pattern, even in melodic pattern, and quiet and decisive in mood or character. Their Design B themes were essentially moderate in tempo, soft in dynamics, duple and triple in rhythmic pattern, even in melodic pattern, and quiet in mood or character. Their themes composed to Design C were most frequently moderate although a number were slow in tempo, no particular dynamic characteristic stood out to any great extent but there was some tendency toward loudness, duple rhythm predominated but triple was also in evidence and syncopation, though not present to any great extent, was more noticeable in this category than in the others by the same composers. These themes were even in melodic pattern, and quiet and somewhat decisive in mood or character. The Design D themes by the Popular composers were moderately fast in tempo, loud and climactic in dynamics, duple and quite frequently triple in rhythmic pattern, even and rising and/or falling in melodic pattern with the only indication of jaggedness for any of the themes by this group of composers appearing in this category, and decisive, with some themes tending toward quietness and others toward restlessness, in mood or character.

As heard by the expert auditors, the Popular composer themes composed to the designs were generally not as loud as and not as fast as the Standard composer themes. They were also more quiet, less jagged and less syncopated than the Standard composer themes.

A more detailed study of the characteristics of the various categories of themes by the two groups of composers could be made from the table but the most outstanding characteristics for each category have been pointed out. When these are considered along with the statements by the authority, the observations made from the scores, and the summary of the catalogue of elements found in the themes, there can be no question that certain characteristics were predominant in the themes to each design and that these predominant characteristics were different and distinct from each other according to the design to which the themes were written. Also, regardless of the method used in determining the outstanding characteristics of the themes composed to the different designs, the results were essentially the same.

The responses by the expert auditors furnished an additional check on the experiment. Since their responses revealed as outstanding the same characteristics that were observed as outstanding in the scores, there can be no question about the adequacy of the performance by the pianist or her ability to interpret the themes satisfactorily.

RESPONSES OF TRAINED AND UNTRAINED AUDITORS

The outstanding characteristics of the themes to each design have been established but the fact that those characteristics exist does not provide evidence that they are sufficiently strong to enable auditors to associate the themes with their respective designs, or that auditors, if they can make such associations, will use the same bases for their associations as the composers used for writing the themes. In order to provide this evidence, the themes were played to auditors. Each auditor was asked to associate each theme with one of the designs or, more specifically, to select for each theme the particular design which he felt was most closely associated with the theme. At the close of the hearing each auditor was asked to state the bases he used for making his associations.

The themes played in random order and the auditors' responses to them appear in Table 2. The symbol in the first column of the table identifies the theme. The Roman number refers to the composer; I to XXII inclusive are for Standard composers and XXIII to XXXII inclusive are for Popular composers. The letter part of the symbol identifies the design to which the theme was composed. The Arabic number indicates the location of the theme in Appendix B under its appropriate composer and design heading. The number in the second column of the table identifies the location of the theme in the sequence of the random playing order. The connection between the theme and the design, as ascertained from the composer's remarks, is indicated in the third column of the table. Column four shows the percentage of the design selections by 20 trained auditors for a particular theme which agreed with the design to which the theme was composed. Column five shows the same for 10 untrained auditors and column six the same for the 30 auditors considered as a single group. "*All,*" which appears in the THEME column, refers to the four themes immediately above it considered together. The themes omitted from Table 2 were used in the pre-hearing for these auditors.

The order of random playing and the results of auditor selections for individual themes were examined and compared to determine whether or not the actual sequence of the themes influenced the

TABLE 2

Percentage of design selections by auditors at random playing which corresponded with the design to which the theme was composed

Theme	Playing Order	Connection†	20 Trained	10 Untrained	All Auditors
I-A-15*	27	O	85	50	73
I-B-2	44	O	50	90	63
I-C-13	23	O	90	90	90
I-D-8	19	O	100	90	97
All			*81*	*80*	*81*
II-A-16	31	T	40	40	40
II-B-1	64	O	55	20	43
II-C-1	84	I	45	50	47
II-D-2	75	I	85	60	77
All			*56*	*43*	*52*
III-A-12	78	I	15	20	17
III-B-14	45	I	20	30	23
III-C-14	32	I	75	70	73
III-D-4	60	I	80	90	83
All			*48*	*53*	*49*
V-A-19	28	I	00	00	00
V-B-10	51	I	45	30	40
V-C-19	41	I	60	60	60
V-D-17	63	I	05	20	10
All			*28*	*28*	*28*
VI-A-3	40	T	35	50	40
VI-B-5	21	O	70	80	73
VI-C-7	49	I	45	60	50
VI-D-11	83	O	65	60	63
All			*54*	*63*	*57*
VII-A-20	13	I	00	10	03
VII-B-6	34	I	30	30	30
VII-C-17	46	I	65	70	67
VII-D-15	70	I	35	30	33
All			*33*	*35*	*33*
VIII-A-6	12	I	75	50	67
VIII-B-12	39	I	100	60	87
VIII-C-12	20	I	90	90	90
VIII-D-10	38	P	40	70	50
All			*76*	*68*	*73*
IX-A-14	52	I	45	60	50
IX-B-4	53	I	50	20	40
IX-C-4	66	I	50	30	43
IX-D-20	69	I	00	10	03
All			*36*	*30*	*34*
X-A-4	87	I	25	30	27
X-B-3	80	I	10	10	10
X-C-21	43	I	15	10	13
X-D-19	26	I	05	40	17
All			*14*	*23*	*17*
XI-A-8	82	I	70	70	70
XI-B-13	47	I	45	10	33
XI-C-5	48	I	30	30	30
XI-D-6	76	I	70	60	67
All			*54*	*43*	*50*
XII-A-17	81	I	80	50	70
XII-B-18	35	I	45	50	47
XII-C-8	72	I	50	40	47
XII-D-9	74	I	65	60	63
All			*60*	*50*	*57*
XIV-A-5	14	I	100	70	90
XIV-B-8	15	I	75	40	63
XIV-C-9	17	P	60	50	57
XIV-D-1	36	P	95	90	93
All			*83*	*63*	*76*
XV-A-18	58	I	10	20	13
XV-B-20	79	I	40	60	47
XV-C-18	65	I	70	70	70
XV-D-3	59	I	80	60	73
All			*50*	*53*	*51*
XVI-A-7	30	I	65	30	53
XVI-B-11	67	I	80	90	83
XVI-C-10	61	I	00	00	00
XVI-D-12	68	P	45	20	37
All			*48*	*35*	*43*
XVII-A-11	77	I	15	50	27
XVII-B-19	22	I	65	70	67
XVII-C-15	16	I	35	40	37
XVII-D-13	73	I	15	10	13
All			*33*	*43*	*36*
XVIII-A-2	42	T	80	50	70
XVIII-B-9	37	I	80	60	73
XVIII-C-11	24	I	05	20	10
XVIII-D-5	57	O	75	60	70
All			*60*	*48*	*56*

* Roman Numerals I–XXII indicate Standard Composers; XXIII–XXXII indicate Popular Composers; Capital Letters indicate Design; Arabic Numbers indicate Theme Order as arranged in Appendix B. Themes omitted were used for a pre-hearing in this playing order.

† Connection Between Theme and Design:

O—Melodic contour followed outline of design.
T—Design suggested type of composition.
I—Theme composed to impression received from design.
P—Received Programmatic idea from design. Theme composed to that idea.
M—Tone evolved from Mathematical computation.

TABLE 2 (continued)

Theme	Playing Order	Connection†	20 Trained	10 Untrained	All Auditors	Theme	Playing Order	Connection†	20 Trained	10 Untrained	All Auditors
XIX-A-10	71	T	60	60	60	XXVI-A-9	105	I	50	20	40
XIX-B-16	18	I	90	70	83	XXVI-B-2	96	I	15	50	27
XIX-C-6	55	I	40	00	27	XXVI-C-10	117	I	00	30	10
XIX-D-7	62	I	90	40	73	XXVI-D-7	115	I	35	20	30
All			*70*	*43*	*61*	*All*			*25*	*30*	*27*
XXI-A-1	56	M	90	60	80	XXVII-A-4	103	I	05	10	07
XXI-B-15	54	T	35	40	37	XXVII-B-6	97	I	30	10	23
XXI-C-2	85	O	80	70	77	XXVII-C-9	94	T	25	50	33
XXI-D-21	50	P	00	00	00	XXVII-D-5	111	I	30	60	40
All			*51*	*43*	*48*	*All*			*23*	*33*	*26*
XXII-A-13	25	T	55	50	53	XXVIII-A-1	114	I	85	40	70
XXII-B-17	86	P	80	70	77	XXVIII-B-5	92	O	65	30	53
XXII-C-3	29	I	40	30	37	XXVIII-C-5	118	I	50	60	53
XXII-D-14	33	O	50	30	43	XXVIII-D-9	119	I	00	10	03
All			*56*	*45*	*52*	*All*			*50*	*35*	*45*
XXIII-A-8	93	P	80	40	67	XXIX-A-3	112	P	65	60	63
XXIII-B-4	110	P	80	60	73	XXIX-B-9	101	T	75	50	67
XXIII-C-1	113	P	10	20	13	XXIX-C-8	100	T	30	30	30
XXIII-D-8	90	P	00	10	03	XXIX-D-1	109	I	85	80	83
All			*43*	*33*	*39*	*All*			*64*	*55*	*61*
XXIV-A-7	107	I	25	10	20	XXX-A-2	88	I	100	80	93
XXIV-B-7	95	I	65	30	53	XXX-B-1	116	I	80	40	67
XXIV-C-7	106	I	35	40	37	XXX-C-6	108	I	00	30	10
XXIV-D-10	91	I	05	20	10	XXX-D-4	89	I	95	70	87
All			*33*	*25*	*30*	*All*			*69*	*55*	*64*
XXV-A-5	102	I	30	50	37	XXXII-A-6‡	121	P	35	38	36
XXV-B-10	104	I	15	50	27	XXXII-B-8	123	P	35	63	44
XXV-C-3	98	T	55	60	57	XXXII-C-2	122	P	35	00	24
XXV-D-2	99	I	55	60	57	XXXII-D-3	120	P	47	50	48
All			*39*	*55*	*44*	*All*			*38*	*38*	*38*

‡ Themes by Composer XXXII heard by 17 Trained and 8 Untrained Auditors.

judgements by the auditors. Were the judgements made to one theme influenced by the preceding theme? Were the contrasts or similarities between two adjoining themes determining factors in auditors' selections?

No consistent pattern which differed appreciably from the chance pattern of the random order could be discovered either when two themes to the same design came together, when two themes by the same composer came together, when themes to any particular design followed the themes to any other particular design or when low correspondence themes were considered in their relationships with preceding themes. It cannot be stated that no influence due to the playing order existed since all factors in the playing and hearing were not controlled specifically for that purpose. However, the lack of any consistent relationship pattern or patterns and the statement by Mursell that ". . . the effect of a composition may be so powerful that the immediately preceding emotional and affective state of the listener does not greatly matter, because it becomes swiftly oblit-

TABLE 3

Percentage of design selections by auditors at playing according to composer which corresponded with the design to which the theme was composed

Theme	Playing Order	Connection†	10 Trained and Untrained Auditors	Theme	Playing Order	Connection†	10 Trained and Untrained Auditors
III-A-12*	2	I	60	XVII-A-11	1	I	80
III-B-14	3	I	50	XVII-B-19	3	I	80
III-C-14	1	I	50	XVII-C-15	4	I	20
III-D-4	4	I	70	XVII-D-13	2	I	30
All			*58*	*All*			*53*
V-A-19	2	I	00	XXIII-A-8	4	P	50
V-B-10	3	I	70	XXIII-B-4	3	P	50
V-C-19	4	I	50	XXIII-C-1	1	P	40
V-D-17	1	I	00	XXIII-D-8	2	P	40
All			*30*	*All*			*45*
VII-A-20	4	I	30	XXV-A-5	2	I	30
VII-B-6	2	I	40	XXV-B-10	1	I	30
VII-C-17	1	I	60	XXV-C-3	4	T	80
VII-D-15	3	I	80	XXV-D-2	3	I	60
All			*53*	*All*			*50*
IX-A-14	1	I	80	XXVI-A-9	1	I	30
IX-B-4	4	I	30	XXVI-B-2	3	I	30
IX-C-4	3	I	50	XXVI-C-10	2	I	00
IX-D-20	2	I	30	XXVI-D-7	4	I	70
All			*48*	*All*			*33*
X-A-4	1	I	80	XXVII-A-4	3	I	50
X-B-3	2	I	10	XXVII-B-6	1	I	70
X-C-21	3	I	40	XXVII-C-9	2	T	60
X-D-19	4	I	50	XXVII-D-5	4	I	50
All			*45*	*All*			*58*
XI-A-8	3	I	60	XXXII-A-6	2	P	30
XI-B-13	4	I	60	XXXII-B-8	1	P	20
XI-C-5	1	I	40	XXXII-C-2	3	P	30
XI-D-6	2	I	50	XXXII-D-3	4	P	40
All			*53*	*All*			*30*
XVI-A-7	4	I	30				
XVI-B-11	2	I	70				
XVI-C-10	3	I	10				
XVI-D-12	1	P	70				
All			*45*				

* Roman Numerals I–XXII indicate Standard Composers; XXIII–XXXII indicate Popular Composers; Capital Letters indicate Designs; Arabic Numbers indicate Theme Order as arranged in Appendix B. Only themes in this table were used in the hearing.

† Connection Between Theme and Design:
I—Theme composed to impression received from design.
P—Received Programmatic idea from design. Theme composed to that idea.
T—Design suggested type of composition.

erated" (25:205) would make it seem quite possible that an auditor's reactions to one theme may be quickly obliterated by a succeeding theme and his reactions to the latter may be influenced relatively little by the former. It must be borne in mind, also, that about half a minute elapsed between themes and each time during that period the random order playing number of the theme to be played was announced. Further experimentation to determine how quickly and completely auditors' reactions change with changing tonal patterns would give a further insight into this problem.

The themes played according to composer and the auditors' responses to them appear in Table 3. The explanations for this table differ from those for Table 2 in that the playing order in this one is given for each group of four themes and that the responses are given for only the one group of ten trained and untrained auditors.

If there were no relationship between a theme and the design to which it was composed, it could be presumed that only chance was operative and that 25 per cent of the design selections by the auditors would correspond with the design to which the theme was written. An examination of the tables shows that these design selections varied from no correspondence all the way to complete correspondence and that certainly in many of the cases something other than chance was operative.

CORRESPONDENCE ACCORDING TO THE DESIGNS

The average percentages to which selections of designs by auditors corresponded with the designs to which the themes were written are given in Table 4. In the "a" part of the table are found the averages for themes by nineteen Standard and eight Popular composers. These were compiled from the results of the playing in random order given in Table 2 except that the themes by Composer XXXII were omitted because they were not available when the themes were played for some of the auditors.

TABLE 4

Average percentages of design selections by auditors which corresponded with the designs to which the themes were composed

a. Themes by Nineteen Standard and Eight Popular Composers

Design	Playing in Random Order								
	Standard composer themes			Popular composer themes			Standard and popular composer themes		
	20 trained auditors	10 untrained auditors	All auditors	20 trained auditors	10 untrained auditors	All auditors	20 trained auditors	10 untrained auditors	All auditors
A	49.7	43.2	47.5	55.0	38.8	49.6	51.3	41.9	48.1
B	56.1	48.9	53.7	53.1	40.0	48.8	55.2	46.3	52.2
C	49.7	46.3	48.6	25.6	40.0	30.4	42.6	44.4	43.2
D	52.6	47.4	50.9	38.1	41.3	39.2	48.3	45.6	47.4
All	*52.0*	*46.4*	*50.2*	*43.0*	*40.0*	*42.0*	*49.4*	*44.5*	*47.7*

b. Themes by Eight Standard and Five Popular Composers

Design	Playing in Random Order 30 Trained and Untrained Auditors			Playing According to Composer 10 Trained and Untrained Auditors		
	Standard	Popular*	Standard and Popular*	Standard	Popular	Standard and Popular
A	30.8	37.2	33.3	52.5	38.0	46.9
B	40.8	38.8	40.0	51.3	40.0	46.9
C	40.4	27.5	35.4	40.0	42.0	40.8
D	32.9	35.6	33.9	47.5	52.0	49.2
All	*36.2*	*34.8*	*35.7*	*47.8*	*43.0*	*46.0*

* Themes by one Composer were checked by only 25 Auditors.

The significance of the results given in this table can be shown by means of a graphic illustration. For that purpose the responses of all the auditors to all the themes by the Standard composers, given in Table 4 as 50.2, are shown in the unshaded histogram found in Figure 1. In the same figure and superimposed on the first histogram is another histogram, shown by the shaded area, which indicates the expected distribution of design choices by the auditors if only chance were operative. In only two trials out of a thousand would as few as one auditor or as many as fifteen out of the thirty be expected to select by chance the design to which a theme was written. Also, in only nine trials out of a thousand would as few as two auditors or as many as fourteen of the thirty be expected to select by chance the design to which a theme was written. However, fourteen or more auditors selected the correct design for forty-four of the themes. For a large number of the themes many more than fourteen auditors selected the correct design. This heavy weighting of themes at the upper end of the scale alone signifies that chance alone did not determine the selections made for more than half of the themes. The fact that there was a piling up of themes toward the upper end of the shaded histogram adds further weight to this conclusion. Extremely significant is the fact that a valley appears in the actual distribution at the region of greatest expectancy. It would seem evident from that fact also that the chance distribution would not be the appropriate one to attribute to the results of the experiment. Another factor which must not be overlooked is that no auditors selected the correct designs for three of the themes and that only one auditor selected the correct design for each of the themes. It is quite evident that the operation of chance alone could not account for these phenomena. The five themes present a problem for more detailed investigation and will be discussed in a later section

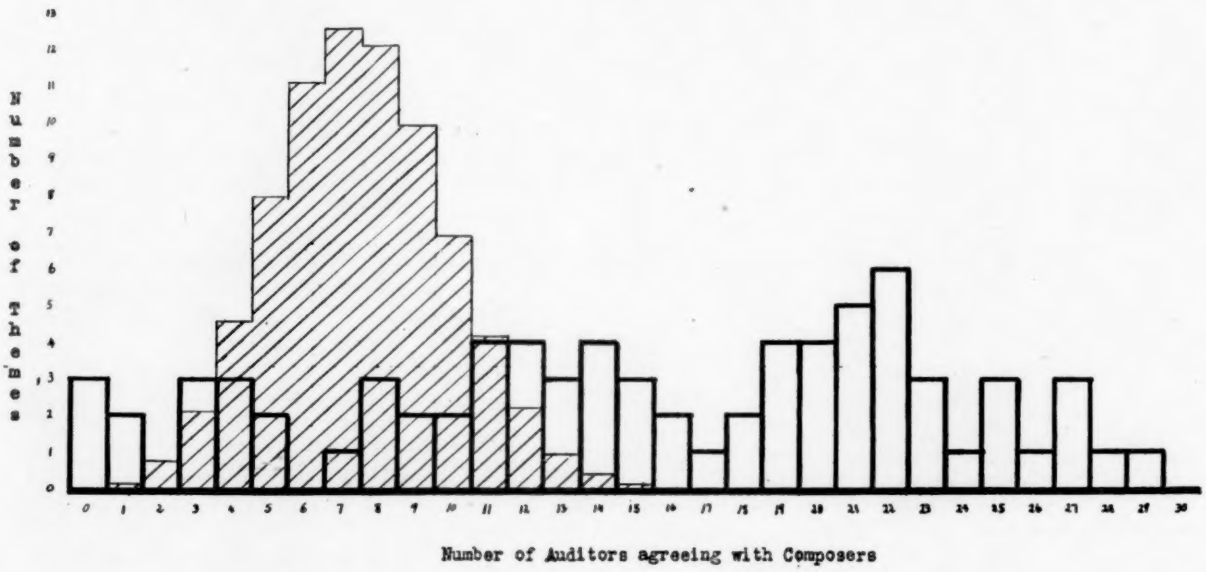

FIG. 1. Number of auditors who selected for a given theme the design to which it had been ascribed by its composer. Unshaded histogram is the actual distribution of the choices of 30 auditors for 76 themes. Shaded histogram is the chance distribution for 76 themes based on a probability of one-fourth.

of this report. Only twenty-seven of the seventy-six themes could be expected in more than one trial out of a hundred to receive the number of correct choices attributed to them and, of the twenty-seven, four at the upper end are outside the expected range.

The illustration presented in Figure 1 provides an example of what might be shown about each item in the "a" part of Table 4. In some cases the illustrations would be even more striking than the one presented while in other cases the illustrations, although a little less striking, would still be convincing that chance had very little if anything at all to do with the outcome of the auditors' selections. Also, the evidence is conclusive that to a large extent auditors did associate the themes with the designs to which they were written. One exception should be noted. This is in regard to the Design C themes by the Popular composers. It appears from the trained auditors' responses to them that the selection might have been made by chance or that there was no consistency in the type of themes written to Design C by the Popular composers. It should be remembered from the summary of characteristics heard in the themes by expert auditors, from the catalogue of elements found in the themes, and from the observations made from the scores that a great many irregularities were observed in this group of themes. As mentioned before, a more detailed investigation of them will be made later.

Table 4 provides another point of interest. In most cases and on an average the trained auditors' selections corresponded more frequently with the designs to which the themes were written than did the untrained auditors' selections. For the Standard composers' themes that was consistently true but it varied for the Popular composers' themes. Although the differences are not statistically reliable for these small groups, since they are predominately in one direction they might lead to the implication that auditors who have had musical training can make such associations more frequently, particularly when the themes are written by Standard composers, than can auditors who have not had musical training. It might be suggested, although there is no conclusive evidence provided by this experiment for the implication and further investigation would be necessary to establish it, that trained auditors can more readily perceive the content of the music or the composers' intent than can untrained auditors.

The "b" part of Table 4 provides a summary of auditors' responses to themes by eight Standard and five Popular composers when these themes were played in random order and when they were played according to composer. The table shows that, although the correspondence was fairly low at the playing in random order for this particular group of themes, there was a decided increase in the correspondence when the themes were played according to composer. In a few cases the differences were quite small and could be attributed to the fact that different auditors participated at the two different hearings. But in the majority of cases the differences were so great it must be conceded that auditors could make correct design associations much more frequently when these composers' themes were compared with each other than when their themes were compared with those by other composers. This would seem to indicate, at least for the composers whose themes were used in this part of the experiment, that there was quite a difference from composer to composer in the general character of themes they wrote but within this general character each composer wrote themes which were sufficiently distinct to permit the auditors to associate them with the correct designs much more frequently than chance association alone would permit.

An additional check on the correspondence between designs and themes was possible from the auditors' responses when the themes were played according to composer. Since there were 24 possible orders in which the four themes by one composer could be played, it can be presumed that an auditor might select by chance the actual order in which the four themes by one composer were played in one case out of 24. Ten auditors and themes by thirteen composers provided 130 order choices with the expectation that 5.42 order choices would be correct by chance. There were actually 23 correct order choices made by the ten auditors or 4.24 times as many as would be expected by chance. This indicates clearly that something very different from chance was in operation while the auditors were selecting designs to correspond with the themes.

One interesting fact was noted in the analysis of the responses by this group of auditors. All of the auditors who had a considerable number of order choices correct had ten or more years of musical training although not all auditors with that amount of training had such a relatively high proportion of correct order choices. There was not enough specific information available about the backgrounds of these auditors to furnish a basis for an explanation of this peculiarity. Neither were there enough auditors at this particular hearing to permit any statement that a definite relationship exists between musical training and ability to make the correct design choices for all of the themes by one composer. The problem would, however, seem worthy of further investigation both from the standpoint of musical accomplishment and from the standpoint of musical ability.

CORRESPONDENCE ACCORDING TO THE CONNECTIONS BETWEEN THE THEMES AND THE DESIGNS

Tables 2 and 3 indicate the connections between the themes and the designs. These connections were based on statements by the composers. The terminology used in identifying these connections represent classifications of connections rather than the specific statements by the composers. The classifications used were Impression, Programmatic Idea, Outline, Type, and Mathematics. Themes which were composed to impressions the composers received from the designs were placed in the Impression classification. These were determined by composers' statements such as: "I can only say that my themes are really my abstract reflection of the design, without any attempt to make them so-called pictorial in music." "Working with the designs I simply interpreted musically the feeling created within me on viewing them." "The first thing that popped into my mind." When the design suggested a programmatic idea to a composer, the theme that was composed to the idea was placed in the Programmatic Idea classification. Illustrations of statements used as bases for this classification are: "Falling Star" and "I worked on this theme with a concrete image or picture in mind, that of a Chinese junk rocking on the tide, her odd-shaped sail silhouetted against a sky of soft pastel colors." When the composer indicated that the melodic contour of the theme followed the outline of the design, the connection was taken to be by Outline. Illustrative statements are: "This seems to be a passage for two clarinets, at least so it came to me at first sight of the design; following the lines of the design, the enclosed melodic passage was suggested." "Primary idea (conceived immediately after looking at the design); to imitate the general outline of the design in the melodic lines." When the design suggested a type of composition to the composer, the connection was said to be by Type. Illustrative statements are: ". . . via 'literary' suggestion = canon." "The simplicity and commonness of Design A immediately suggested a four-part chorale." The connection for the single theme in Mathematics classification is best explained by the composer's own words. "On opening A, I saw first the mathematical possibility mentioned in #2 above and figured out an arbitrary equation of time and note vibration. Then I thought of what this long held A would be like in a composition and imagined that its effect could very well suggest the kind of a simple impressive character that the physical representation of a square has. I put this down thinking at the same time of all the exemplifications of the square such as square numbers as described by the Greek mathematicians and also of such things as square dances; square phrases; square, meaning 'honest' and felt that all of them were not as impressive as the doubled A played on some neutral instrument like the Hammond organ, which in a way leaves as much open space for contemplation around it as the square."

One composer mentioned that one of his themes was the result of a forced musical expression. Since that theme was used in the pre-hearing at the playing in random order, it did not appear in Table 2 and therefore the classification did not appear. That type of expression is so unnatural for a composer that it does not warrant further discussion.

In the cases of a number of themes with which the composers did not include specific statements about connections with designs, the connections were taken to be by Impression since the themes themselves did not give any indications whatsoever that they were intended for particular types of compositions, that they followed the outlines of the designs, that any programmatic ideas were involved, or that in any way there might be some mathematical connection.

Table 5 gives the number of themes in each classification and the correspondence for each classification between auditors' selections of designs and the designs to which the themes were written. The "a" part of the table provides this information from the results of the playing in random order. In spite of or because of its uniqueness, the single theme having connection by Mathematics showed a high correspondence. Those themes that followed the outlines of the designs also showed a high correspondence. It might seem possible to discount to some extent the significance of the correspondence for this classification because the relationship might seem too obvious in this rather unusual approach to writing themes. An examination of the themes, however, will reveal that they are not necessarily unusual in type, pattern, or character from those found in music literature. The types of approach represented by the other three classifications, namely Type, Programmatic Idea, and Impression, cannot be said to be foreign to the practices of composers. Yet in each case the correspondence was quite a bit above what might have been expected by chance. In addition, the "b" part of the table discloses that low correspondence themes in the random playing revealed a much higher correspondence when they were played according to composer. The increase was particularly noticeable when the connections were Impression and Type. This indicates that composers' themes, connected with stimulating designs by Impression or Type, which showed low correspondence at the playing in random order, were more readily associated with the correct designs when they were considered in relationship to other themes by the same composer than to themes by other composers. This, in turn, would seem to permit the inference that when the connection is by Impression or Type,

TABLE 5

Connection between themes and designs and percentage of correct design selections by auditors

a. Themes by Nineteen Standard and Eight Popular Composers

	Playing in Random Order											
	Standard composer themes				Popular composer themes				Standard and Popular composer themes			
Connection*	Number of Themes	20 Trained Auditors	10 Untrained Auditors	All Auditors	Number of Themes	20 Trained Auditors	10 Untrained Auditors	All Auditors	Number of Themes	20 Trained Auditors	10 Untrained Auditors	All Auditors
I.	53	47.5	42.3	45.8	22	40.5	39.5	40.2	75	45.5	41.5	44.1
P.	6	53.3	50.0	52.2	5	47.0	38.0	44.0	11	50.5	44.5	48.5
O.	10	72.0	64.0	69.3	1	65.0	30.0	53.3	11	71.4	60.9	67.9
T.	6	50.8	48.3	50.0	4	46.3	47.5	46.7	10	49.0	48.0	48.7
M.	1	90.0	60.0	80.0	0	—	—	—	1	90.0	60.0	80.0

b. Themes by Eight Standard and Five Popular Composers

	Playing in Random Order 30 Trained and Untrained Auditors						Playing According to Composer 10 Trained and Untrained Auditors					
	Standard		Popular		Standard and Popular		Standard		Popular		Standard and Popular	
Connection*	Number of Themes	Auditors	Number of Themes	Auditors†	Number of Themes	Auditors†	Number of Themes	Auditors	Number of Themes	Auditors	Number of Themes	Auditors
I.	31	36.2	10	29.7	41	34.6	31	47.1	10	42.0	41	45.9
P.	1	36.7	8	38.6	9	38.4	1	70.0	8	37.5	9	41.1
T.	0	—	2	45.0	2	45.0	0	—	2	70.0	2	70.0

* Connection between themes and designs:
I—Theme composed to impression received from design.
P—Design suggested programmatic idea. Theme composed to that idea.
O—Melodic contour followed outline of design.
T—Design suggested type of composition.
M—Tone evolved from mathematical computation.

† Themes by one composer were checked by only 25 auditors.

themes present themselves as being more individual with respect to their composers than with respect to stimulating designs but when considered with respect to the individualities of the composers, they then become individual with respect to the designs.

FACTORS ASSOCIATED WITH LOW CORRESPONDENCE THEMES

The averages for the correspondence between design selections and designs to which themes were composed furnish conclusive evidence that the themes generally were associated with the designs to which they were written much more frequently than would be expected by chance. However, a number of themes showed quite a low correspondence and these need further investigation. For that purpose all themes which showed less than 30 per cent of the auditors' design selections in agreement with the designs to which the respective themes were written will be considered in this section. Eleven of the Standard composers had themes in this group. The first themes Composers III, VII, XV, XVI, and XIX wrote to the designs showed the lowest percentages for their respective themes. Three composers remarked they had difficulty in writing a theme to the first design they attempted but that the procedure was less difficult for the other designs. Since their first themes were not all to the same design, it might be presumed that, for some composers, lack of familiarity with this type of composing played a part in determining the acuity of their responses. Among the Popular composers the peculiarity was evident only for Composer XXXII.

Another trend which seems to be indicated is that some composers generally write only quiet themes or only restless themes. This was ascertained by taking into account auditors' statements that they usually judged quiet themes for A or B and restless themes for C or D. The quiet trend was predominant for Composers IX, X, and XXIII, while the restless trend was predominant for Composers III, VII, and XXVII. The average for each of these composers was quite strongly increased when the playing was according to composer. The increase was less pronounced, however, for the themes by Composers XI, XVI, XXV, and XXVI. It was observed that the auditors' design judgments for the four themes by each of these composers were fairly equally distributed among the four designs at the random playing. The average for Composer XVII showed a large increase at the latter playing but this is accounted for principally on the basis of the individual themes. His Design A theme was marked "innig" which would indicate quietness without decision. It was judged strongly as B. His Design D theme built up to a climax and then dropped down to a single-voice jagged melody. It was judged as C probably because of the single-voiced jagged melody at the end.

Composer XXXII presents a unique illustration. The average for his themes decreased at the playing according to composer while that for all other composers increased. He wrote all of his themes to ideas received from the designs and might therefore have deviated too far from the designs for any relationship to exist. But Composer XXIII did the same and his average increased at the later playing. Therefore it is necessary to investigate further by examining the content of the ideas of Composer XXXII. In his letter appeared the following: "My reflections are most likely the result of a state of mind forced on me by present conditions in the world today. Creative art can hardly escape the mirror through which we see everything colored and distorted." His remarks to each design were: Design A, "An enclosure, a prison from which there is no possible escape. The Universe is entrapped. There are no doors or windows for light or ventilation. It is slow extinction of the human race, groping and praying for release." Design B, "A bleak, uninhabited continent of cooling, molten rock. A volcano is at work in the center." Design C, "Cathedrals—sinking in water and quicksand. They are making their last stand against the ravages of time and elements: (or war?)." Design D, "The apex first catches my eye. The figure is traveling upward at terrific speed, presumably to attack some object, possibly Mars." In no other composers' remarks ascribed to their designs or statements made in their letters did such a consistent reference to war, destruction, and despair appear. While one case is not sufficient for any definite conclusions, it has seemed sufficiently significant to mention.

Themes that were composed in immediate successtion present some interesting facts. As far as could be definitely ascertained from the information received, there was at least one theme in the low correspondence group by each composer who wrote his themes in immediate succession. Composers V and XXX followed this procedure and the decrease in the correspondence for each of their themes followed the same order in which the themes were composed. Composer V mentioned, "It is simply as if a complete composition (or conception) were developing itself, at a perfectly normal tempo, in my unconscious." In his comments to the second theme he composed appears: "It shows clearly that my first musical impulse was continuing in my unconscious, quite independently of any influence the design might have." Composer IX wrote his themes at five minute intervals. His themes were largely judged as being quiet. The theme to Design D by Composer XXI was composed immediately after his theme to Design B and it, as well as the Design B theme, was judged as B. Composer XXVIII composed his themes all in one afternoon but allowed some time to intervene between the themes. He expressed a decided preference for Design C and dissatisfaction with his results to Design D which followed Design C. His Design D theme was judged almost entirely as C. Another point of interest concerning his themes was that out of 120 judgments made to all of his themes, only 12 were made to Design D. A somewhat similar relationship was observed in the judgments to the Design A theme by Composer XXIV. It was composed immediately after his theme to Design C and was judged more frequently to correspond with Design C than to any other design. He composed all of his themes in immediate succession and the first three were in the same key. It was impossible to ascertain whether or not themes by Composer XXVI were composed in immediate succession since he failed to give date and time for each but his themes were copied in the order of the letters of the alphabet and the first three of them were judged quite strongly as A.

Composer XVIII wrote all of his themes in one afternoon. He mentioned in his comments that he composes away from an instrument and that he rarely changes a note in his compositions once the notes are recorded. This assurance in his writing seemed to be indicated by the high percentages, 70 or more, of judgments for his themes to correspond with the designs for which they were intended except for his Design C theme. This theme was the only one he submitted that he had revised. Composer XXV stated, "Outside of whatever degree of talent any composer possesses, I believe complete concentration of the greatest value." There was a two minute interruption for conversation while this composer was writing the theme to Design B, and the correspondence of judgments for it was lower than to the other themes by the same composer.

The preceding account has included all of the themes that showed a low percentage of correspondence to the designs to which they were written according to the combined judgments of the trained and untrained auditors during the random playing of the themes. It is in no wise intended to be an "explaining away" of the low correspondence but instead, to draw attention to the fact that it does exist and that in each case there were factors associated with its existence.

Factors associated with the Popular composers' Design C themes which were not discussed among the low correspondence themes are also of interest since this particular group seemed to show more irregularities than any other group in the study. Composer XXIX commented about Design C, "The three peaks suggest the $3/4$ tempo of a waltz in C." It is quite clear that he received his suggestion for a type of composition from only parts of the design rather than the entire design. Composer XXVII also wrote a waltz theme to this design. Composer XXV commented, "Design C suggests an etude to me. Something brilliant and rather brittle." The suggestion for this type of composition apparently came from the entire design and the theme was quite readily associated with the design. It was ascertained from an interview with Composer XXIV that he had difficulty with his Design C theme because it was his first theme to a design and he was not familiar with the process of composing to designs.

The themes by Composer XXII bear special attention though none of them appeared among the low correspondence group. Every one of them tended to be slow. No other composer wrote all slow themes. The composer's own statement would seem significant in this regard. "In connection with the working out of this theme (D) it might be of interest to note that I have already appropriated it in part to use as the second or slow theme of the final movement of my Symphony No. II, on which I have been working these past three years. I had been 'stuck,' so to speak, in finding a suitable slow theme for this last movement, and after writing the fragment for design *D,* I suddenly realized that here, subconsciously perhaps, I had evolved the beginning of the theme for which I had been so long trying to write!" It seems that, since he had been "stuck" for a slow theme, his attention in composing themes had been strongly centered in that direction. He had selected for consideration, out of the extremely wide range of possibilities among themes, only those that were slow. His reactions to designs were not obliterated by this selection, only conditioned by it. It seems that both influences were strongly in evidence in his case.

Taking into account the fact that the playing order of the themes did not provide any consistent sequential pattern in auditor responses and that there were factors associated with each low correspondence theme according to the conditions and circumstances under which it was composed and according to the composer's feelings, state, and reactions during the composing period, it seems that auditor reaction was largely determined by the theme itself, not its relationship to the preceding tonal pattern, and that the circumstances and conditions under which the composer composed the theme and his feelings, state, and reactions during the composing period affected to quite an extent the content of the theme. This, in turn, would seem to indicate that the composer's feelings, state, and reactions during the composing period and the circumstances and conditions under which he composed played a part in influencing the reactions of the auditors. It might also be presumed that the theme carried to the auditors something from and of the composer himself. This can, by no means, be stated conclusively from the data of this experiment and needs further careful investigation for verification or rejection.

REMARKS ABOUT RELATIONSHIPS BETWEEN THE THEMES AND THE DESIGNS

The outstanding characteristics of the themes to each design have been established. Auditors were able to associate the themes with the designs to which they were composed far more frequently than chance would permit and it is therefore evident that something other than chance was operative when the auditors made their selections. The problem remaining for solution is whether or not this "something other than chance" for the auditors was the same thing that was operative in the case of the composers when they composed the themes. The only intermedia for auditors and composers were the designs and the themes composed to them. For that reason the reactions, in the form of brief comments, of the two groups about the relationships between the themes and the designs were secured. A summary of the content of the composers' comments and the auditors' comments appears below.

COMPOSERS' COMMENTS

Design A

Standard Composers: 8 comments pertained to firmness, definiteness, and impressiveness; 4 mentioned adopting formal types of compositions, namely, fugue, canon and 2 four-part chorals; 3 mentioned attempting to follow the outline; 3 pertained to the difficulty of writing to the design; 2 to breadth; 1 to simplicity; 1 to a feeling of confinement; 1 mentioned it aroused memories of square dances (though the composer's theme was not usable for a square dance); 1 stated the composer ". . . figured out an arbitrary equation of time and note vibration." (220 sec. and 220 d.v.); and 1 merely mentioned that it suggested a theme.

Popular Composers: 2 comments pertained to firmness and evenness of beat; 1 to difficulty of writing to the design; 1 to smoothness and calmness, and 1 to confinement.

AUDITORS' COMMENTS

Design A

Twenty Trained Auditors: 15 comments pertained to definiteness, regularity, or firmness; 2 to being diatonic or classic; 1 to being philosophical; and 1 to those "not fitting other categories."

Ten Untrained Auditors: 9 comments pertained to wholeness or completeness; 4 to firmness; 4 to evenness; 2 to monotony; and 1 each mentioned "introduction" and "A's reminded me of music bouncing around in the square."

Ten Trained and Untrained Auditors: 4 comments pertained to deliberateness and dignity; 3 to completeness; 2 to firm regularity of meter; and 1 each mentioned "solid harmony," "an angular forceful feeling seemed to suggest a square," and "A was rather difficult, as squares seem slightly inane

Design B

Standard Composers: 11 comments pertained to quietness, smoothness, or the flowing character of the design while one mentioned "a feeling of 'curve' but sectional rather than flowing"; 6 referred to objects, namely: cradle, canoe, Chinese junk, false teeth, kidney, and internal organs, 1 mentioned that the design brought to mind Ravel's *Bark on the Ocean;* 1 that the outline was followed but that the details of rhythm and pitch were not determined by the design; 1 stated it suggested a crab canon (which he wrote); 1 mentioned it as being disagreeable; 1 "a great joke"; 2 indicated it was more difficult than the more violent designs; 1 stated "B makes no musical sense"; and 1 indicated the theme was somewhat similar to those written to the other designs as all seemed to be part of a single composition.

Popular Composers: 2 comments pertained to calmness and wavy character; 1 indicated the design suggested a barcarolle; 1 a trundle bed; 1 "a bleak, uninhabited continent of cooling, molten rock"; 1 something rather mysterious; 1 stated the "design inspires no musical thought"; and 1 gave the personal feeling of the composer while working on the problem, "Seems like musically illustrating the love life of an amoeba."

Design C

Standard Composers: 6 comments pertained to sharpness and irregularity of tune and rhythm; 5 to harmonic discordance; 5 to forcefulness and storminess; 3 to contrapuntal complexity; 3 to following the outline by melody or rhythm; 2 to harshness and ugliness; 2 indicated the design was suggestive musically while 2 mentioned it was not evocative of an expressive theme; 1 indicated it was foolishly modernistic while another that it was "somewhat archaistic"; 1 stated it was "more suggestive of another or more violent expression such as a stone hurled through a plate glass window" while another, "it has a real beauty of its own, something like a snow-flake, but to me it would never suggest a musical idea"; 1 each indicated the connection with the theme as "icicles," brilliance, "announcing the entrance of the grand inquisitor," a feeling of elation with "a mental image of somebody to me and I have no feeling for them. I'm afraid I assigned to it what was left."

Design B

Twenty Trained Auditors: 11 comments pertained to quietness, smoothness, or flowing character of rhythm or melody. Other expressions used were: "mood," "chromatic," "narrow range," "outline," "much pedaling," and "usually involved full basses."

Ten Untrained Auditors: 8 comments pertained to rocking or flowing character of melody or rhythm; 3 to quietness; and 1 each mentioned "seemed rather hypnotic in its repetition," "like B most," and "saddle."

Ten Trained and Untrained Auditors: 10 comments pertained to a quiet, smooth, flowing effect; 1 each mentioned "sometimes triple meter," "indefinite harmony," and "deviation from A not extreme."

Design C

Twenty Trained Auditors: 6 comments pertained to irregularity; 3 to discord; 3 to speed; 2 to dynamics or mass; and 1 each mentioned "counter-melody," "outline," and "treble."

Ten Untrained Auditors: 5 comments pertained to sharpness and irregularity; 4 to harshness and discordance; and 1 each mentioned "outline," "no definite completion," "suggestive of sound waves on a photoscope," "like C less," and "variety, with definitely repeating theme."

Ten Trained and Untrained Auditors: 8 comments pertained to irregularity and sharpness; 3 to speed; 2 to discord; and 1 each mentioned "a sense of spreading out and coming together," "seemed to suggest embroidered patterns," and "it was difficult to distinguish between C and D."

Design D

Twenty Trained Auditors: 11 comments pertained to the rise and fall of pitch or intensity or both; 2 to being sharp and pointed; 1 mentioned "extreme range" and 1 "outline."

Ten Untrained Auditors: 5 comments pertained to speed; 3 to rise and fall of pitch; 3 to being sharp or pointed; and 1 each mentioned "annoying," "if figure D were upside down some D's would have been marked as falling upwards as on an upgoing escalator"; 1 mentioned it aroused memories of Stravinsky's *Sacre;* and 1 that a previous musical impression had continued in his "unconscious."

Popular Composers: 2 comments indicated that the idea of tragedy was predominant; one each mentioned it was suggestive musically, it did not suggest any musical theme, it suggested a brilliant and brittle etude, "the three peaks suggest the 3/4 tempo of a waltz in C"; and 1 gave the title as "Temperament."

Design D

Standard Composers: 7 comments indicated vigor or a rapid sweep of the melodic line; 4 pertained to following the outline, one mentioning it in regard to a brief motive and another to writing fuller harmonies as the melodic line ascended gradually in a long theme; 4 mentioned that the design was musically suggestive of which 2 mentioned specifically it suggested two musical lines; 1 each stated "mild discord," "to be played like a fanfare," "aroused memories of . . . Chopin's Prelude in B flat minor," "a murderous shape of some sort, however slightly comic," "evokes the apparition of a stern-faced pianist, making a ferocious attack on the keyboard," and "reminded me of an advertisement of a liquor store in Washington called 'LOKO LIKOR' printed in zigzag type." (The theme accompanying the last statement was written in Blues tempo.)

Popular Composers: 6 remarks pertained to forceful movement at great speed; 1 mentioned it suggested "the sort of phrase one might use in a development group," 1 "An African Dance"; and 1 indicated the composer was "influenced by geometric design rather than by creative desire."

C," "Tried to get a configuration of the selection and call it an 'ah' experience for D."

Ten Trained and Untrained Auditors: 5 comments pertained to rise and fall of pitch or intensity; 4 to speed; 1 each mentioned "often indicated by somewhat chaotic harmony," "was very comparable to *minor* influence," "irregular rhythm," "not as extreme as C," "it was difficult to distinguish between C and D," and "the most forceful motif."

The Designs in General

Twenty Trained Auditors: 9 comments pertained to dynamics and volume; 9 to melodic contour; 6 to visualizing according to design; 5 to rhythmic character; 5 "had to guess in several places"; 4 mentioned different or free associations for each theme; 4 indicated complexity or harshness; 4 pertained to quietness or simplicity; 4 to mood or feeling; 2 to tonal quality; and 1 each mentioned "harmonic structure," "expression or interpretation by pianist," "counterpoint lines," and "completeness." Two auditors felt it difficult to limit their associations to the four designs.

Ten Untrained Auditors: 3 comments pertained to melodic contour as related to that of the designs; 3 to rhythm; 2 to harmony; 1 each to pitch, pauses, and repetitions. Other statements were "satisfying or annoying," "would rather not know instrument," "first judgements almost entirely conscious, formalistic, then more immediate, intuitive reactions gradually established themselves. But formalistic patterns lingered"; and "had to guess in several places."

Ten Trained and Untrained Auditors: 3 comments pertained to rhythm; 2 to feeling and expression; and 1 each mentioned "tempo," "phrasing," "dynamics," "melodic outline," and "repetition."

At the conclusion of the hearings, a number of auditors remarked about the associations they made between music and other art media. These remarks are summed up quite well in the written comment by one of the auditors, a person adept in graphic arts. "The outlines, in my opinion, relate mostly to pitch and rhythm and for that reason I felt these themes weren't very easy to classify. I would much prefer to draw entirely new designs. But music has more visual feeling than mere outline. I'd like more of a feeling of perspective, also different media, and color."

A number of the auditors mentioned

that they considered the designs in pairs. A and B were considered as one pair and C and D as another. Themes were first associated with one of the pairs, then selected for the particular design. This process of elimination was not followed out by all auditors. Many mentioned that their associations were direct, meaning that they considered each theme as a whole and associated it almost spontaneously with a design. Nearly all, however, indicated that they used a conscious rationalizing process at the very beginning and that this gave way to a more spontaneous type of response as the process became more familiar.

Almost without exception the auditors individually approached the experimenter after the hearings and mentioned that the experience of associating designs with music was extremely fascinating as well as unique. Not a single one found it boring or distasteful.

It is quite obvious that the comments by composers and auditors were not exactly the same. The comments could not be expected to be the same since there was no limitation on what might be said or how it might be said. However, the comments themselves are not the major consideration, rather, whether or not from them patterns of reactions can be discovered for both composers and auditors and whether or not these patterns are the same for both groups when a design and the themes composed to it are considered.

These patterns are observable in the material that has been presented. A comparative reading of the two columns shows distinctly that certain ideas were present quite generally in the minds of the composers when they wrote to a particular design and to quite a large extent, these same ideas were present in the minds of the auditors when they judged themes to the same design. Although auditors in no case could be sure they made the proper design selections for the themes, their reactions turned out to be extremely similar to those of the composers. Another fact which is significant is that, to a large extent, the composers' comments pertained to the designs and their relationships with the themes while the auditors' comments pertained to the themes and their relationships to the designs. In spite of this difference in focal point for the comments, the results are highly comparable. Therefore, there can seem to be little question that certain factors stood out for the composers when they wrote themes to a particular design, that certain factors stood out for the auditors when they associated themes with a design, and, when the designs were the same, these factors were the same.

COMPOSERS' STATEMENTS ABOUT THE COMPOSING ACT

Further insight into the creative process in music is provided by composers' statements about the circumstances under which they have received their ideas, the procedures they have followed in dealing with these ideas, and their expectations for their finished products. Many of the composers included such statements with their responses to the experiment.

Thirteen Standard and two Popular composers who did not contribute themes to the experiment stated that the designs did not suggest any musical ideas whatsoever to them. Seven of the Standard composers stated further that they could never find any kind of musical suggestion in any type of visual design but two of them thought that other composers might. However, ten Standard and two

Popular composers who were not able to participate expressed a decided interest in and sympathy with the undertaking and were prevented from contributing themes only because of pressure of other work. Also, one of the composers who contributed themes appropriated his response to one of the designs for use in a symphony he was writing.

Some of the composers' musical ideas, as disclosed by their statements, have resulted from: auditory imagination, suggestions from the "highest commander," the study of a poem and consciously getting into its mood, "the potentialities in an existing form or in an instrumental color or combination of instruments," stimulation by the dance or poetry, "the urge of the printed word, or the abstract sounds of music instrumental, orchestral, vocal," "seeing a painting, contemplating the beauties of nature or feeling in a mood of spiritual exaltation," and being "aroused usually by some human emotion." Further statements in this regard are: "Sometimes I will be walking along, not thinking of music, and a theme will occur to me." "I pass the problem on to my superconscious mind just before I go to sleep and usually awaken the following morning with the theme running through my mind, waiting to be set down."

It was ascertained from the composers' statements that five of them record their initial ideas as quickly as possible and three retain their themes for future use. For four composers the final version of a musical idea might be quite different from the hastily recorded initial version. In contrast, two composers rarely ever change or revise their music once the notes have been written though there may be mental revisions before the notes are recorded. Four of the composers work with abstract musical ideas and abstract musical sounds while several of them are guided in their work by the tones or sounds of musical instruments. Others are frequently guided by poems while one stated that for him the music comes first and the poem is a later choice. One does not use the piano while composing but another works at the piano merely to test his ideas. He does not "think with his hands." Four composers indicated specifically that they feel craftsmanship is very essential in musical composition, in fact, after the initial idea has been received the final product is largely the result of craftsmanship. Three composers indicated that complete concentration on their work without any outside interferences is essential for them to produce satisfactory results. One stated, "This means eliminating as many physical movements as possible so that the brain consciously or unconsciously is burdened with no outside thought impulses, i.e. no smoking, eating or drinking while actually working." Some composers seem to work almost spontaneously at least as far as the initial idea is concerned. Others seem to prepare themselves by getting into the mood of what they want to write. After that they do not spend any conscious effort with the idea and in a day or several days the musical idea appears. This relatively brief working period does not necessarily hold for all composers. One stated "The idea is considered for a period of time from several months to several years but, naturally, not continuously." A number of composers keep in mind the particular set of instruments which will perform their music, the particular audience for which the composition is intended, or possible further developments of the musical ideas they are recording.

Several of the composers stated what they felt music to be. Their statements follow.

"Music to me is a matter of communication."

"My own conception of music is an unending line, a continuous unfoldment, rather than a finite, closed and precise outline, for a thought, an emotion, a spiritual conception can not be circumscribed."

"One always hopes that the finished whole will carry a message of expression for the listener."

". . . I have followed human characteristics and tried to express human emotions. . . ."

The information received from composers clearly indicates that not all composers write to designs and, according to the statements by a number of them, they could never write to designs. Others can write to designs and one composer appropriated his theme to one of the designs of this experiment for use in a symphony. The information indicates further that there is no special circumstance under which ideas are received by all composers. Neither is there any set working procedure which seems to apply to all of the composers or to any one composer all of the time. The composers do, however, seem to be striving to produce music that is an expressive communication for the listeners.

STUDENT RESPONSES

Students' verbal responses and musical responses provide further information about the transposability of visual design stimuli to musical themes. Those responses have been analyzed and summarized according to each design.

Design A

The students had more indication of triple meter or triplet effects in their Design A themes than the composers had. The tempo was generally somewhat faster and the dynamics consistently loud for the students' themes. Their reactions to Design A indicated largely that they felt the music should be quite heavy, stately, even or plain. Five students responded by means of humming square dances, three others by means of humming other compositions. Three students found a musical response to the square difficult and the same number tried to follow the outline of the design. One thought the design suggested "Nothing elaborate. Might be a waltz or just a plain piece."

Design B

Approximately the same proportion of students' themes and composers' themes to Design B were in $3/4$ meter or indicated triplet effects. Moderato was the prevailing tempo of the students' themes but there were less dynamic indications of softness than in the composers' themes. Nearly all of the students' themes to Design B were legato in effect. Their comments pertained generally to the waviness, smoothness, and flowing character of the design and two references were made to objects. The design suggested waltzes to three students and rhythm to one. One student thought it "A horrible design . . . maybe disgusted with the world." Two students responded with hesitancy but one responded very readily. Several gave their reactions by means of familiar compositions.

Design C

Less $3/4$ meter to Design C was used by the students than by the composers.

Students' themes were generally quite similar to composers' themes in tempo and dynamics. Frequent use was made of staccato and accent marks and practically no use of slurs. Eleven of the students commented on trying to follow the outline and seven of them responded by means of familiar compositions. Two students found the design suggestive of swing music, one found it indicative of heavy music, one of light music, and one stated it "Reminds me of comic picture with opera singer singing up and down lots of scales." Again, one student responded very readily and one with hesitancy.

Design D

The meters of the students' themes to Design D were very comparable to those of the composers' themes. Moderate to fast tempi were used for all students' themes while several composers wrote slow themes to this design. The dynamic markings employed were about the same for both groups. Seven of the students' comments referred to the rise and/or fall of melody and dynamics. Three students followed the outline of the design with their themes, four responded by means of familiar compositions, one each found it suggestive of snakes, light reflected by a mirror, and the motion picture "The Firefly." To this design, one student responded very readily and one responded with hesitancy.

It appears that students' verbal responses and general characteristics of their musical responses to each design were quite similar to those of the composers. Practically all of the different ways of arriving at musical suggestions employed by composers were employed by the students. However, the single note for Design A, arrived at by means of mathematics on the part of a composer, was the spontaneous response of two students. The tempo and dynamic markings did not show as wide a variety or as great a difference for students' themes as for composers' themes.

The great differences were revealed by the comparison of the actual themes by the two groups. There was practically no foretelling by a student's verbal reactions to a design what the type of theme would be to that design. Although there seemed to be some consistency in the markings of the themes, the melodic contours did not seem to follow consistent patterns. What seemed to be the determining factor in the students' melodic responses was the recency of their having become familiar with or the recency of their having heard a particular composition. It was learned that most of the compositions used in the students' responses had been either performed in a school organization, heard in a music class, heard over the radio, or heard on the phonograph. The students, either because they were not accustomed to expressing themselves by means of original melodies or because they were not able to do so, frequently resorted to the use of familiar melodies or familiar compositions for their own musical expressions. *Blue Danube Waltz* was used for Designs A, B, and C; Rachmaninoff's *Prelude in C♯ minor* for Designs C and D, and several selections by Wagner were indicated. All of these had recently been heard by the students in school.

IV. SUMMARY

AN EXPERIMENTAL investigation of the creative process in music was conducted by securing themes composed to four designs and statements regarding the connection between the themes and designs from Standard and Popular composers and from high school students. These themes were inspected and analyzed, and the composers' themes were played for one group of auditors to check a list of characteristics heard in the themes and for other auditors to associate the themes with the designs and to state their bases for making the associations.

SUMMARY OF FINDINGS

The findings from the investigation were:

1. Certain characteristics were found generally to be predominant in the themes to each design and these predominant characteristics were different and distinct from each other according to the designs to which the themes were written. The results were essentially the same whether they were ascertained from the statements by an authority after an inspection of the themes, from observations made from the scores, from a catalogue of elements found in the themes, or from a check of the characteristics heard in the themes by expert auditors. The characteristics in the themes to each design were: for

Design A:

Generally duple and regular in rhythmic pattern, moderate or slow in tempo, medium or loud in dynamics, even in melodic pattern, and decisive in character.

Design B:

Generally triple and regular in rhythmic pattern, moderate in tempo, soft or medium in dynamics, even and flowing in melodic pattern, and quiet in mood or character.

Design C:

Generally duple and syncopated in rhythmic pattern, moderate or fast in tempo, loud and accented in dynamics, jagged in melodic pattern, and agitated and quite frequently decisive in mood or character.

Design D:

Generally duple and syncopated but also quite frequently triple in rhythmic pattern, fast in tempo, loud and climactic in dynamics, rising and/or falling in melodic pattern, and impetuous or decisive and restless in mood or character.

2. Several differences in the themes by the two composer groups were indicated by the data of the experiment.

a. The Popular composers' themes were, to a very large extent, in the Major mode while the Standard composers' themes were more frequently atonal or of such a nature that definite keys were not established in the brief themes.

b. For Design C, the Popular composers' themes as a group were not quite as consistent as the Standard composers' themes as a group in character directions, dynamic markings, or tempo indications.

c. As heard by the expert auditors, the Popular composers' themes composed to the designs were generally not as loud as and not as fast as the Standard composers' themes. They were also more quiet, less jagged and less syncopated than the Standard composers' themes.

d. A number of Standard composers indicated various performing media other than the piano for their themes. These media seemed particularly adapted to bring out the outstanding characteristics of the themes.

3. Auditors associated the themes with the designs to which they were composed far more frequently than chance would allow, and it was quite evident that something other than chance was operative when the associations were made. This held true whether the connections between the themes and the designs were by Impression, Programmatic Idea, Outline, Type, or Mathematics. A number of other observations were made in this regard.

a. There seemed to be quite a difference from composer to composer in the general character of the themes written by a number of composers. These themes, however, were sufficiently distinct to permit the auditors to associate them with the correct designs much more frequently than chance association alone would permit when the themes were played according to composer.

b. A number of themes, when connected with the designs by Impression or Type, seemed to present themselves as being more individual with respect to the composers than with respect to the stimulating designs. However, when these themes were considered with respect to the individualities of the composers, they then became individual with respect to the designs.

c. The circumstances and conditions under which a composer composed and his feelings, state, and reactions during the composing period seemed to affect to quite an extent the content of a theme, at least in the cases of the themes judged at the random playing to have low correspondence with their respective designs.

d. It seems quite possible that the auditors' reactions to one theme were quickly obliterated by the succeeding theme and their reactions to the latter were influenced relatively little by the former.

4. There can seem to be little question that certain factors stood out for the composers when they wrote themes to a particular design, that certain factors stood out for the auditors when they associated themes with a design, and, when the designs were the same, these factors were the same.

5. A number of observations were noted from the composers' statements made in connection with the study.

a. Not all composers write to designs and, according to the statements by a number of them, they could never write to designs.

b. Other composers can write to designs and one composer appropriated his theme to one of the designs of this experiment for use in a symphony.

c. The information received from composers clearly indicates that there is no special circumstance under which ideas are received by all of them.

d. There is no set working procedure which seems to apply to all of the composers or to any one composer all of the time.

e. The composers do, however, seem to be striving to produce music that is an expressive communication for the listeners.

6. Students verbal responses and the general characteristics of their musical responses to each design were quite similar to those of the composers, but the melodic contours of the students' themes

did not seem to follow consistent patterns. What seemed to be the determining factor in the students' melodic responses was the recency of their having become familiar with or the recency of their having heard a particular composition.

CONCLUSION

The findings of this study, summarized above, provide evidence from which can be drawn the following conclusion:

There is a carry-over from an abstract design to the resultant musical theme when the theme is composed to the design. This provides an indication that the creative product is influenced by an abstract design or possibly some other visual object when the design or object is used as a stimulus by the creative worker.

SUGGESTIONS FOR FURTHER INVESTIGATION

In future studies similar to this one it would seem advisable to furnish one design to which composers who are not familiar with the process of composing to designs might compose a preliminary theme not to be used in the study. It would also seem advisable to request composers not to compose two themes for the study during the same day.

Suggestions for experimental investigations are found in a number of problems brought forth by this study. They are presented in the following questions:

1. Will a person's reactions to a design and to the theme composed to it be the same when the two are not presented simultaneously?
2. Can trained auditors more readily perceive the content of music or the composers' intent than can untrained auditors?
3. How quickly and completely do auditors' reactions change with changing tonal patterns?
4. Does a musical composition carry to auditors something about the circumstances and conditions under which it was composed or something of the feelings, state, and reactions of its composer during the composing period?
5. Is there a relationship between either musical accomplishment or musical ability and the ability to select designs to which musical themes were written?

It was observed during the course of the investigation several times that selectivity entered into the creative process. That leads the experimenter to believe that the following thesis should be investigated:

The Creative Process is a Selective Process. It should be considered to involve making selections from among very large numbers of possibilities and seeing the relationships of these selections in regard to certain situations.

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APPENDIX A

THE LETTERS to composers requesting their cooperation in the study are reproduced below.

First Request

Dear Mr. . . . :

In connection with my doctoral dissertation at Teachers College, Columbia University, under Dr. James L. Mursell, I am conducting an experimental research study in the creative process in music. You are being approached as one of a carefully selected group, checked by a committee of recognized authorities, as being representative of contemporary composers and it is on this basis that I am soliciting your cooperation in the study.

The study promises to be of value in the extension of knowledge about the creative process. It may give further knowledge as to whether or not listeners hear what composers intend for them to hear and whether or not, through it, we can find an improved method of teaching composition. It will also bring together pertinent psychological findings leading up to the experiment.

The results of this study will be published and recognition will be given in the publication to cooperating composers. A digest of the findings, when the study has been completed, will be sent to them. The material will not be studied on a qualitative comparative basis, but it will be studied from the standpoint of what was done and how it was done. The identity of the material will not be disclosed if the composer specifically states that to be his preference. It is to remain the property of the composer. I desire permission to use it only in this study and whatever further publications may result therefrom.

The enclosed material gives full information. I will appreciate it very much if you can find time to cooperate in this experiment.

Yours very truly,
Rudolph R. Willmann

Second Request

Dear Mr. . . . :

Some time ago you received a request to assist in an experimental psychological study of the creative process in music which I am conducting at Teachers College, Columbia University. Not having heard from you, I am venturing to make a second request.

To the present time I have received a number of responses from among the nation's outstanding composers. A group of eminent psychologists at Columbia University as well as musicians have expressed a deep interest in the findings of this experiment. They feel that the work promises to be a distinct contribution to both musical and psychological knowledge. May I ask your cooperation in assuring the success of the undertaking?

The experimental material is enclosed should the other I sent you not be conveniently at hand. You, of course, will receive a digest of the results when the study has been completed.

Your cooperation and assistance will be a valuable contribution and will be greatly appreciated.

Yours very truly,
Rudolph R. Willmann

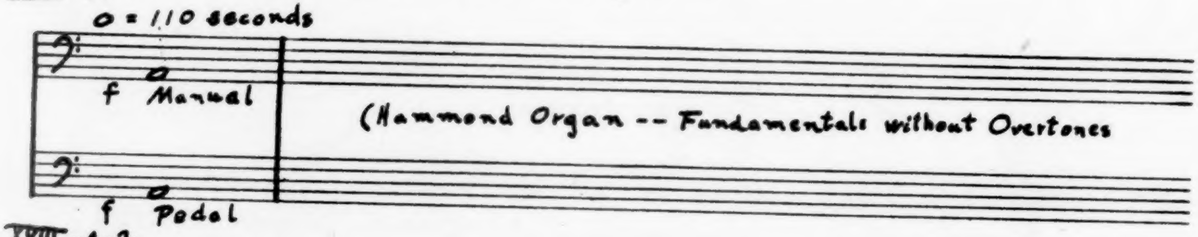
APPENDIX B

THE THEMES submitted by the composers are presented in Appendix B. They are presented in the following groups: DESIGN A, Standard Composers, Popular Composers; DESIGN B, Standard Composers, Popular Composers; DESIGN C, Standard Composers, Popular Composers; and DESIGN D, Standard Composers, Popular Composers. The Roman number identifies the composer, the letter indicates the design to which the theme was written, and the Arabic number identifies the order number of the theme as it appears in one of the groups mentioned above. The orders in which the themes are presented were adopted to facilitate comparisons of the themes as they appear in notation.

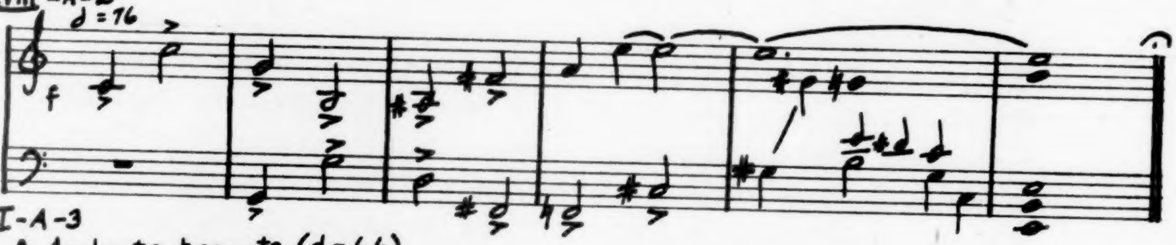
Design A

Standard Composers

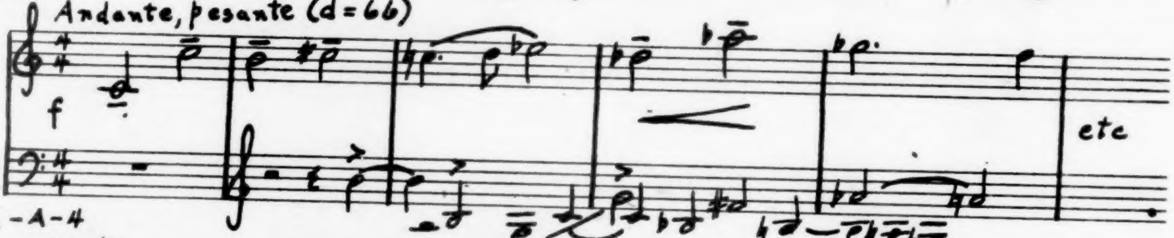
XXI-A-1


o = 110 seconds
f Manual
(Hammond Organ -- Fundamentals without Overtones
f Pedal

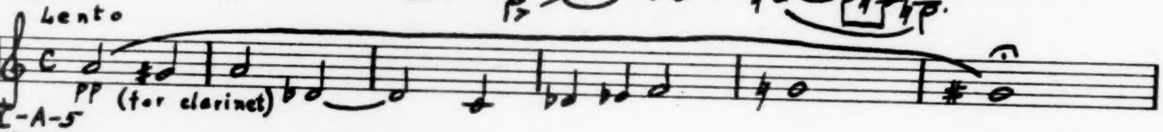
XVIII-A-2



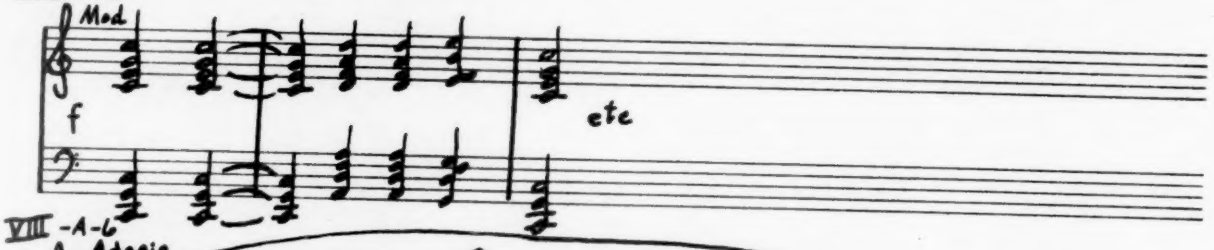
VI-A-3


Andante, pesante (d = 66)
f
etc

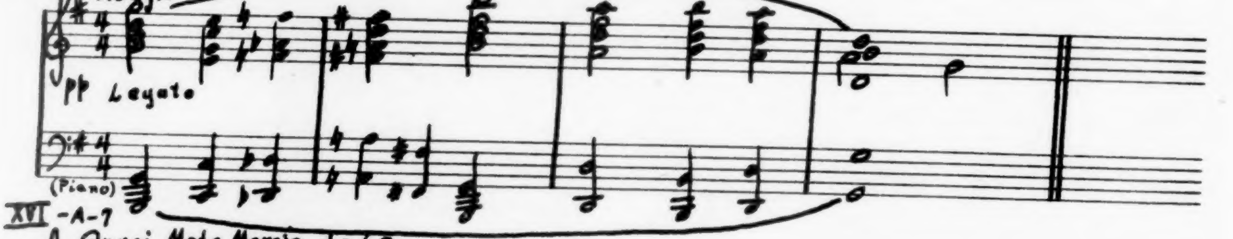
X-A-4


Lento
pp (for clarinet)

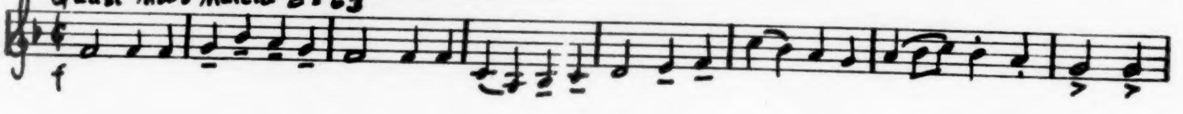
XIV-A-5



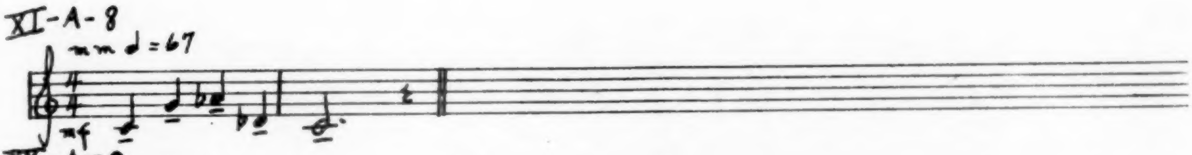
VIII-A-6


Adagio
pp Legato
(Piano)

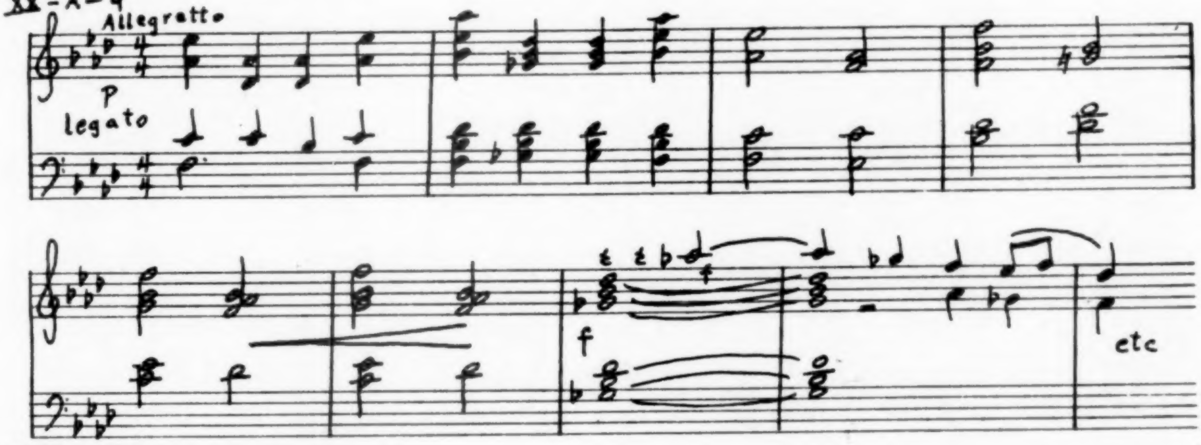
XVI-A-7


Quasi Modo Marcia d = 63
f

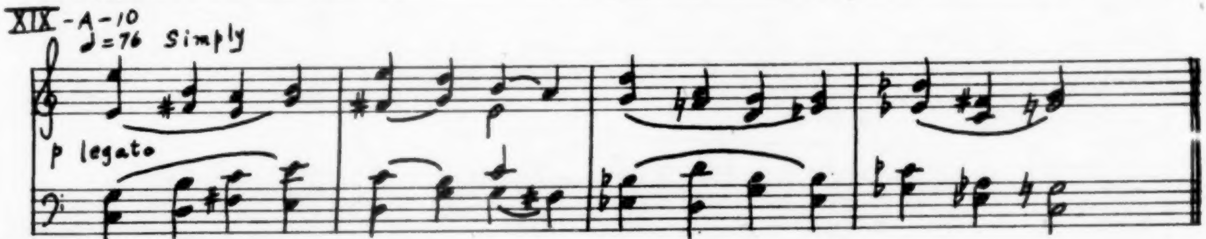
XI-A-8



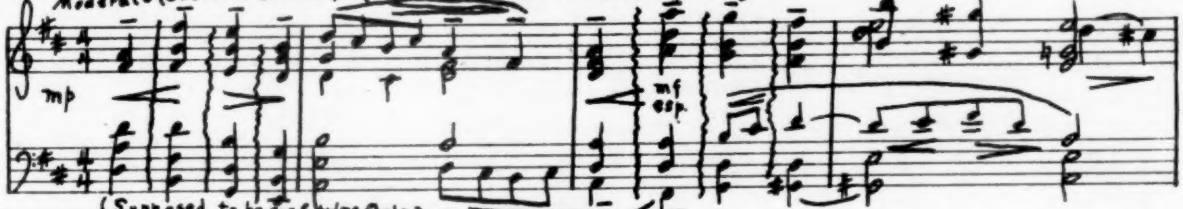
XX-A-9


Allegretto
p
legato
f
etc

XIX-A-10

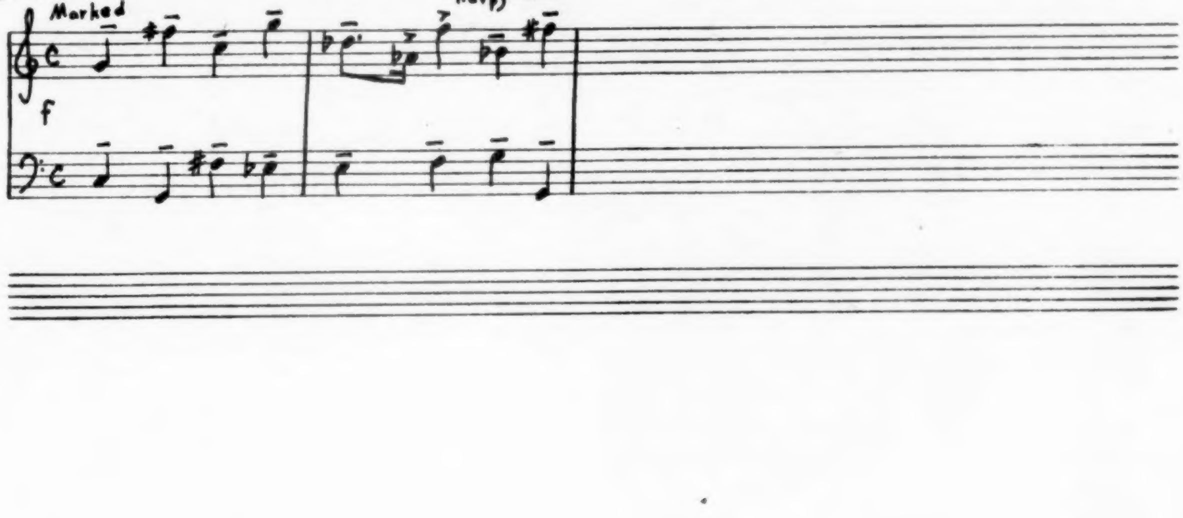

♩=76 Simply
p legato

XVII-A-11 Moderato (Calmo e Solenne) (The Germans would call it „innig"...

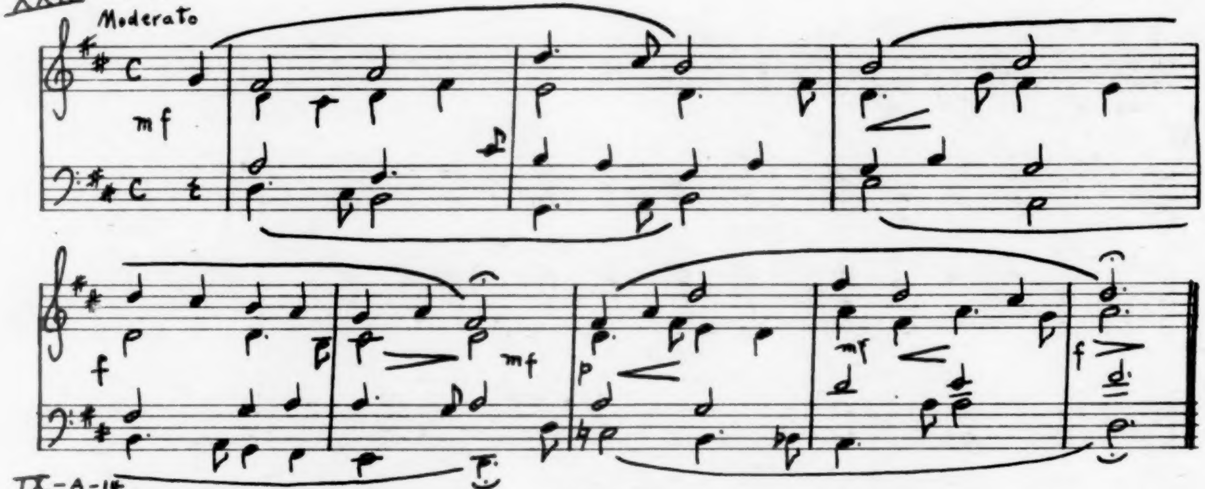


(Supposed to be for String Orchestra + Harp)

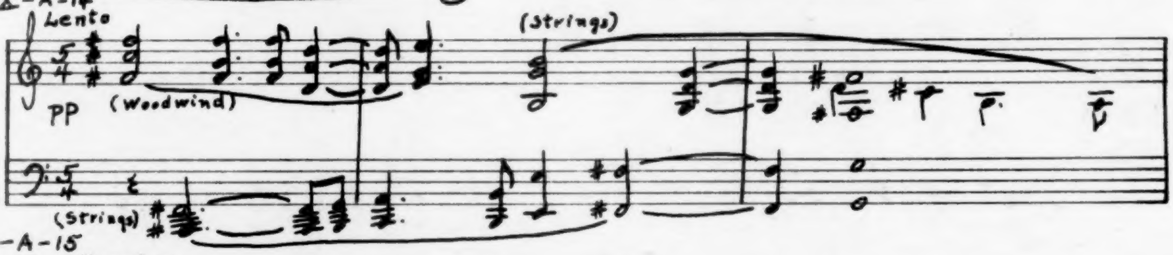
III-A-12



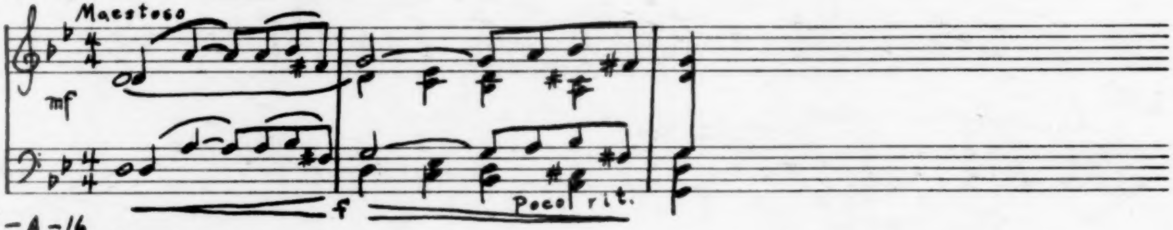
XXII – A-13


Moderato
mf
f
mf
p
mf
f

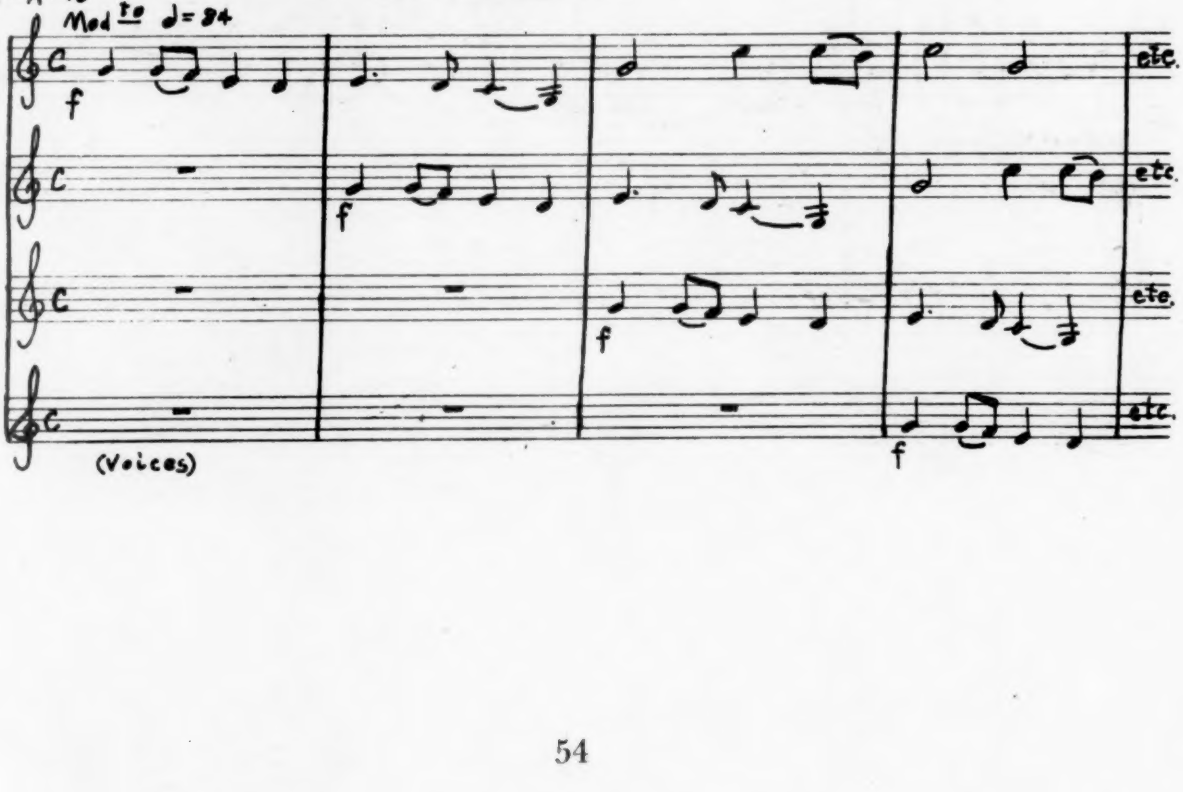
IX – A-14


Lento
PP
(Woodwind)
(Strings)
(Strings)

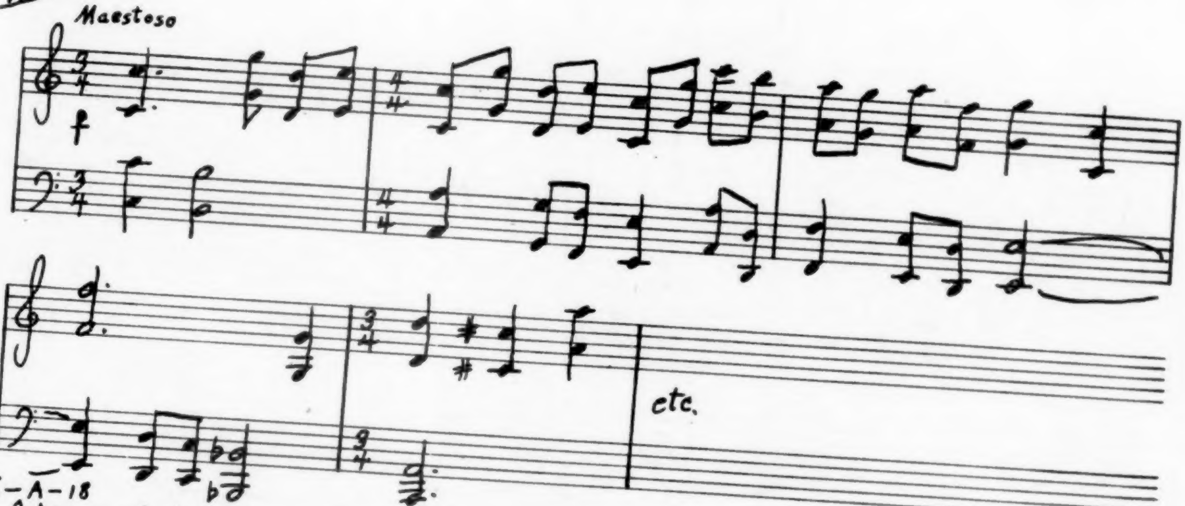
I – A-15


Maestoso
mf
f
Poco rit.

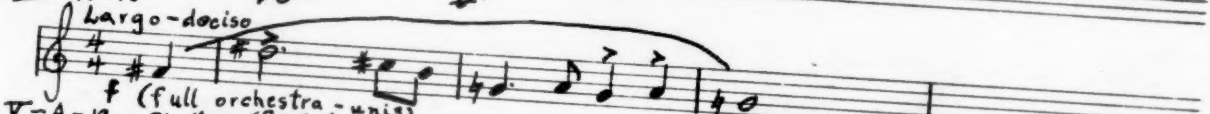
II – A-16


Mod^to ♩= 84
f
etc.
f
etc.
f
etc.
f
etc.
(Voices)

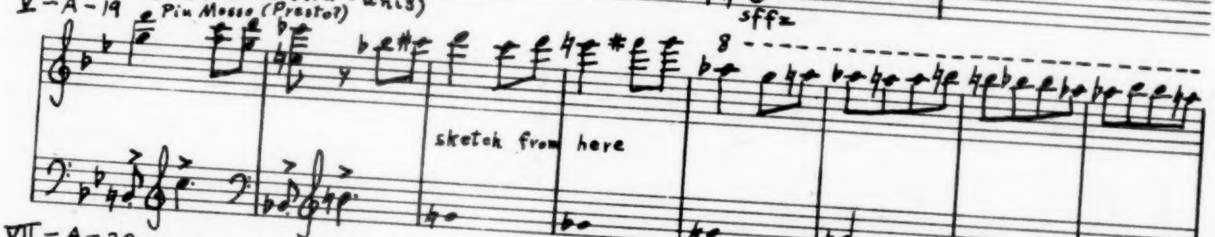
XII-A-17


Maestoso
f
etc.

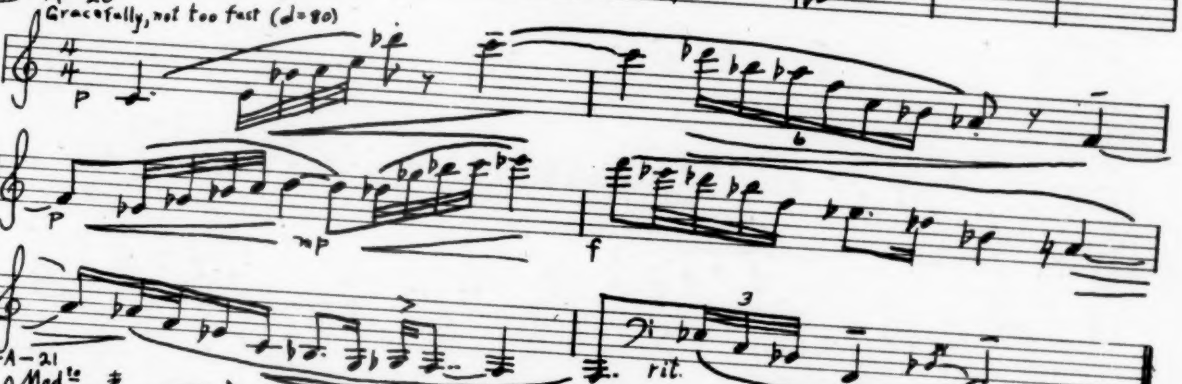
XV-A-18


Largo-deciso
f (full orchestra - unis)
sffz

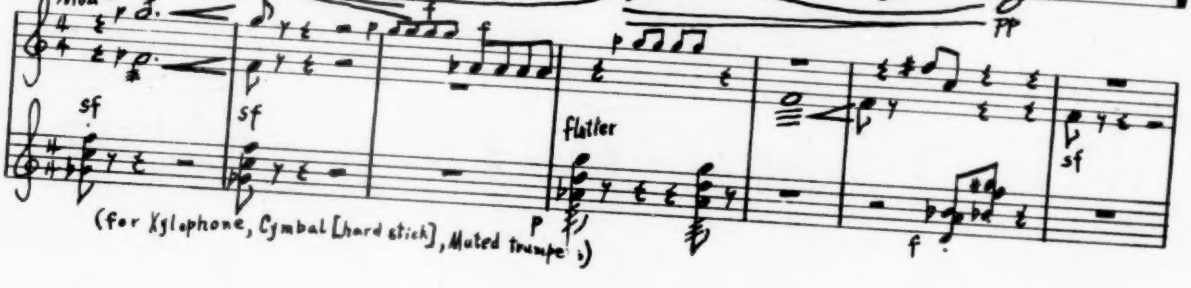
V-A-19


Piu Mosso (Presto?)
8
sketch from here

VII-A-20


Gracefully, not too fast (♩=80)
p
p
mp
f
rit.
pp

IV-A-21

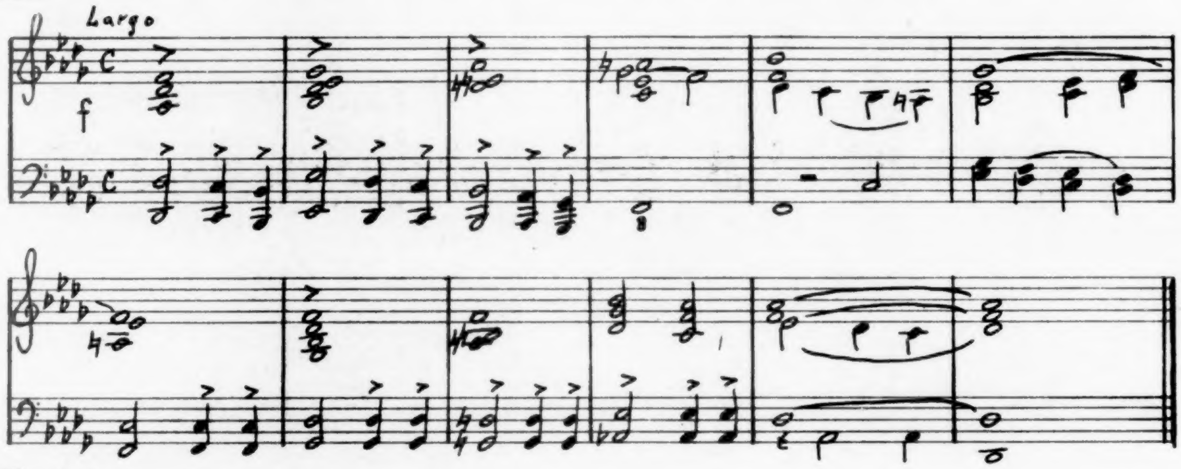

Modto
sf
sf
flatter
p
f
sf

(for Xylophone, Cymbal [hard stick], Muted trumpet)

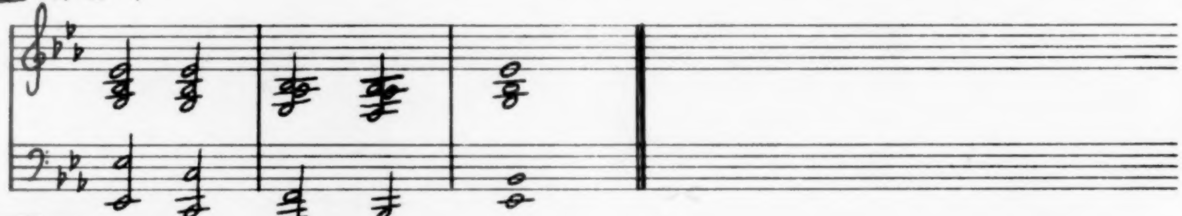
Design A

Popular Composers

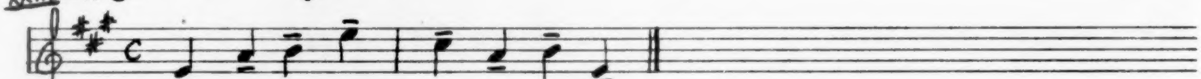
XXVIII -A-1



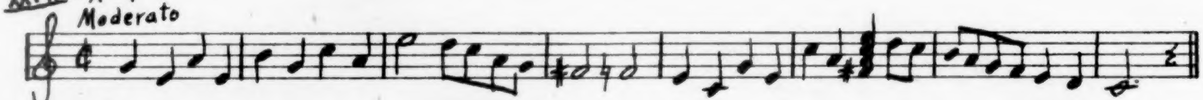
XXX -A-2



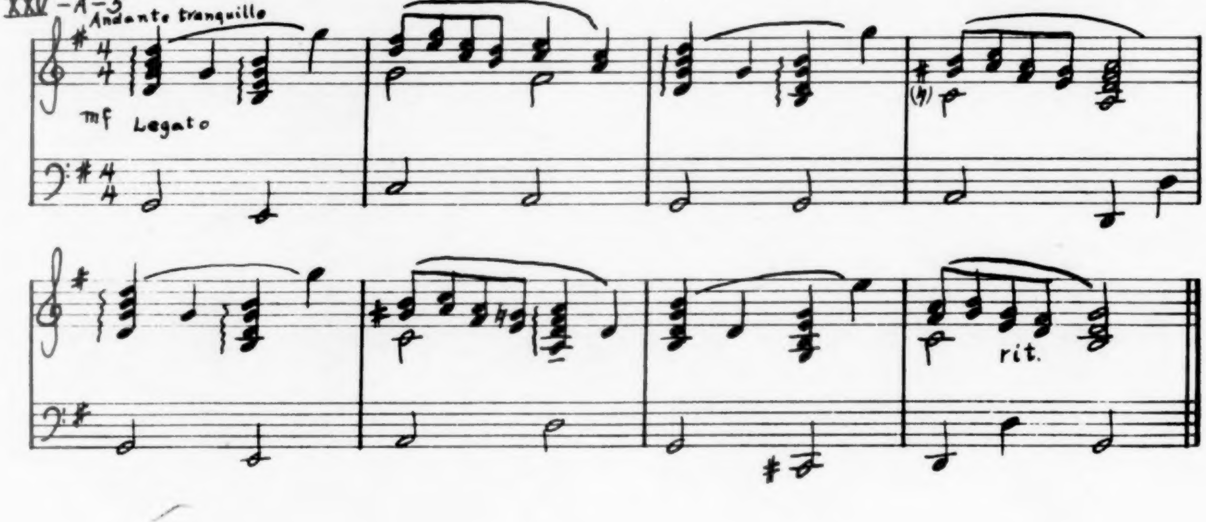
XXIX -A-3



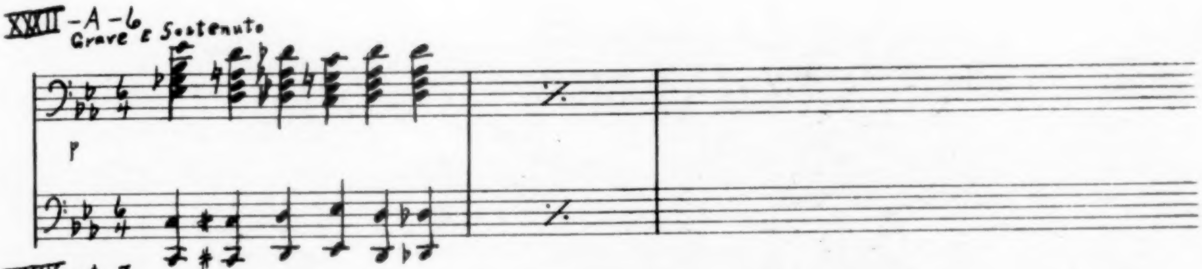
XXVII -A-4



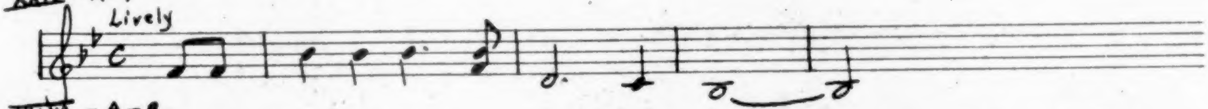
XXV -A-5


Andante tranquillo
mf Legato
rit.

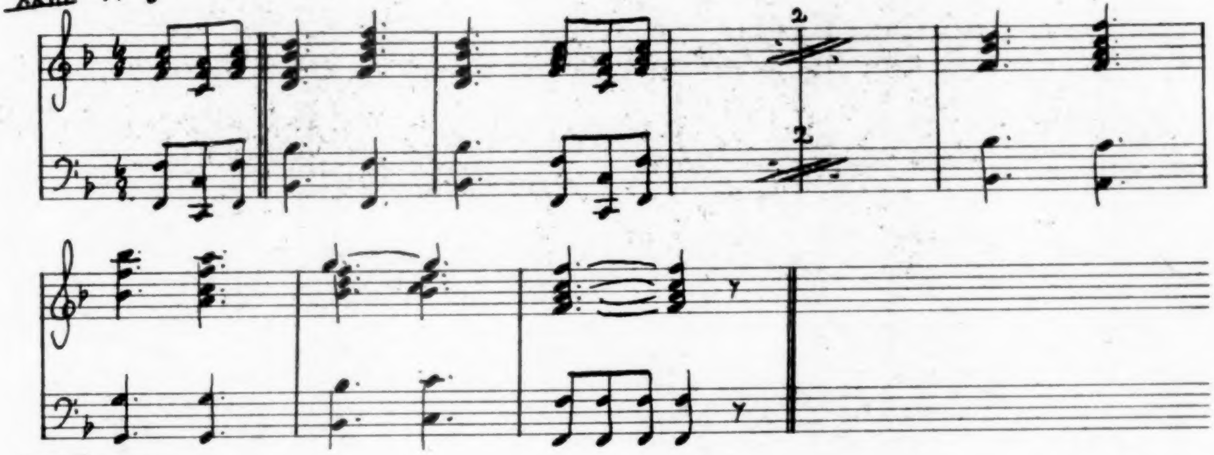
XXIII-A-6


Grave e Sostenuto
p

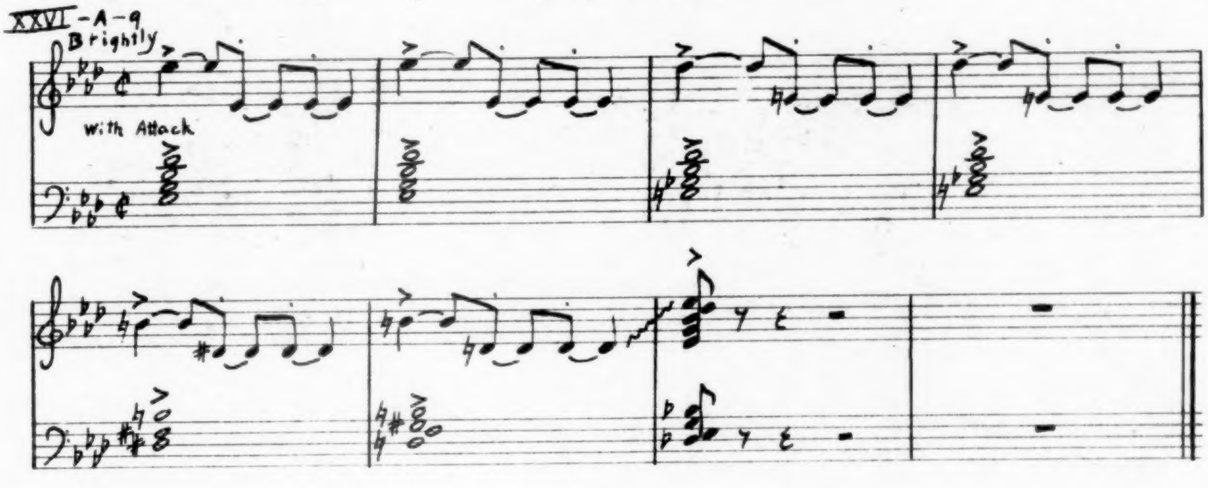
XXIV-A-7



XXV-A-8



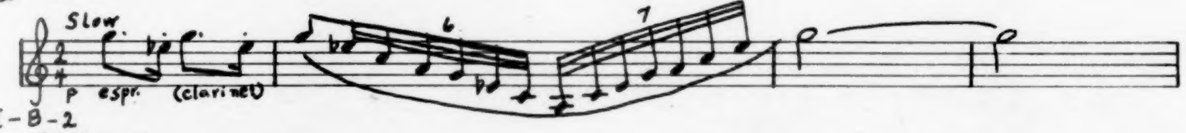
XXVI-A-9


Brightly
With Attack

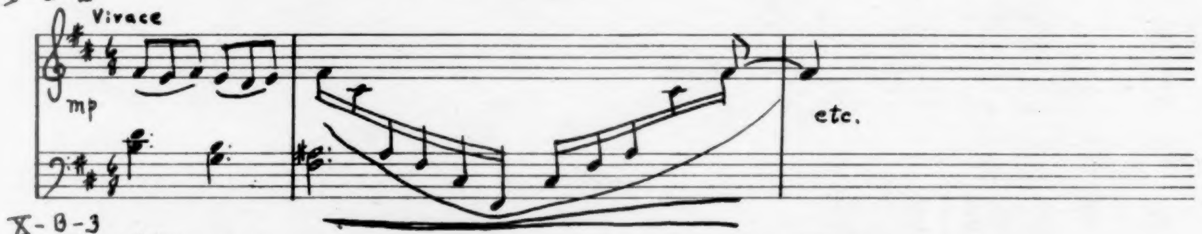
Design B

Standard Composers

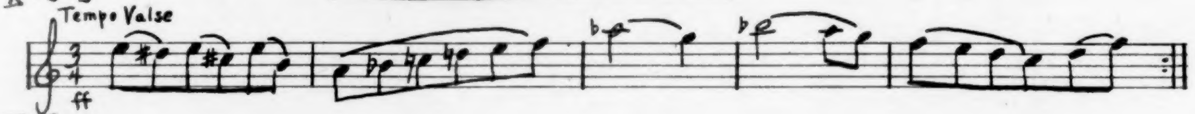
II-B-1


Slow
p espr. (clarinet)
6
7

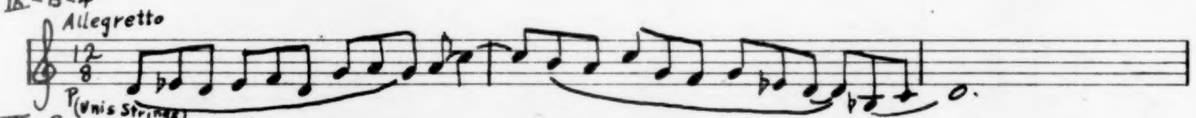
I-B-2


Vivace
mp
etc.

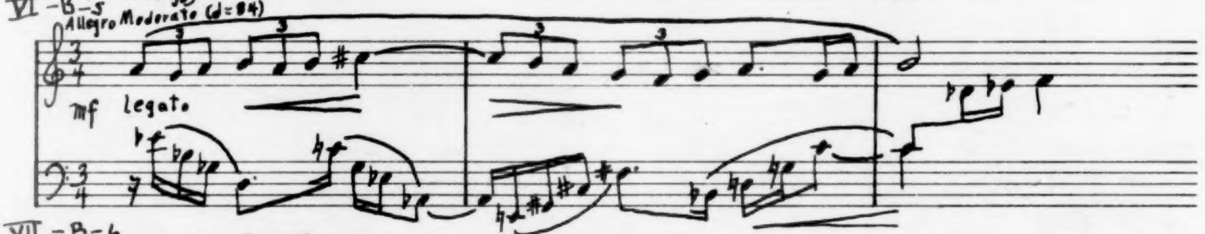
X-B-3


Tempo Valse
ff

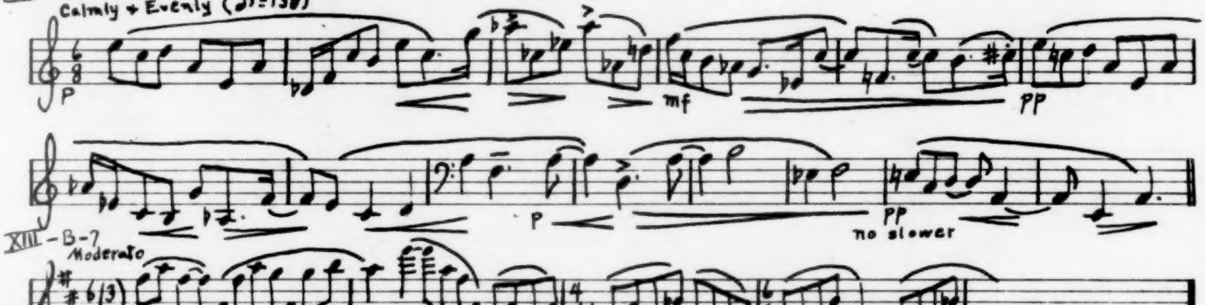
IX-B-4


Allegretto
p (Unis Strings)

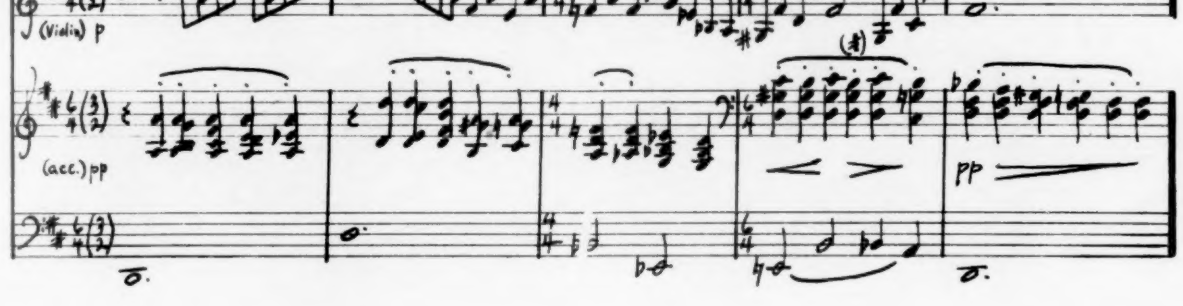
VI-B-5


Allegro Moderato (♩=84)
mf legato
3

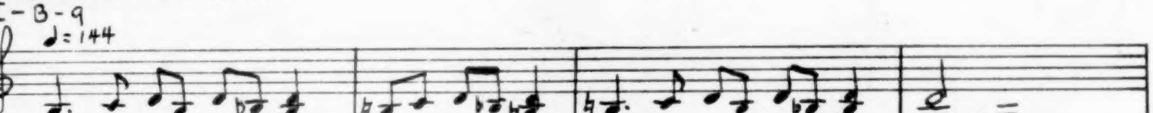
VII-B-6


Calmly + Evenly (♪=138)
p
mf
pp
p
pp
no slower

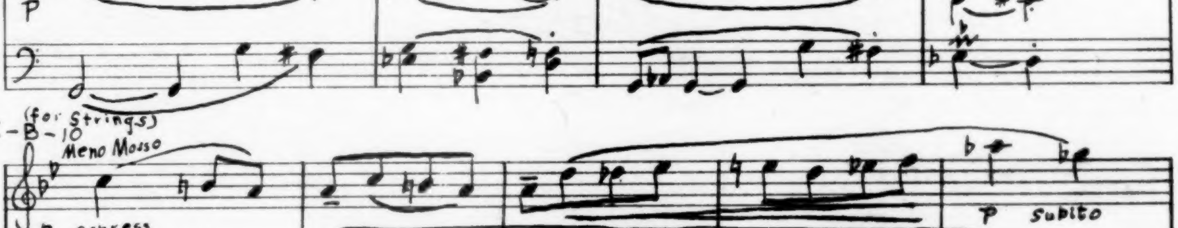
XIII-B-7


Moderato
(Violin) p
(acc.) pp
(♯)
pp

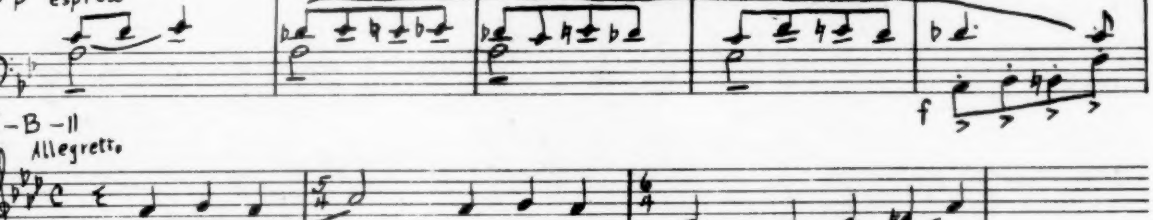
XIV - B - 8


Andante
mp dolce (for oboe)

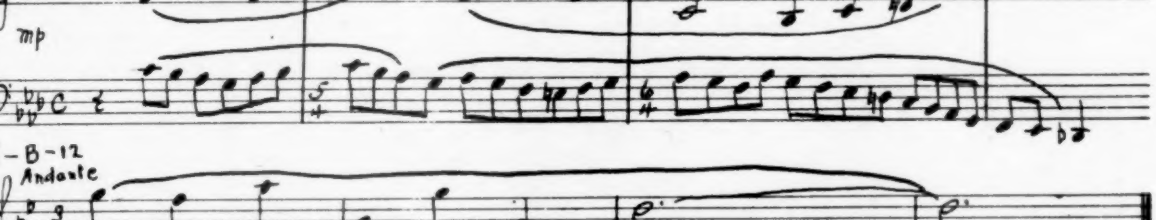
XVIII - B - 9


♩= 144
p
(for Strings)

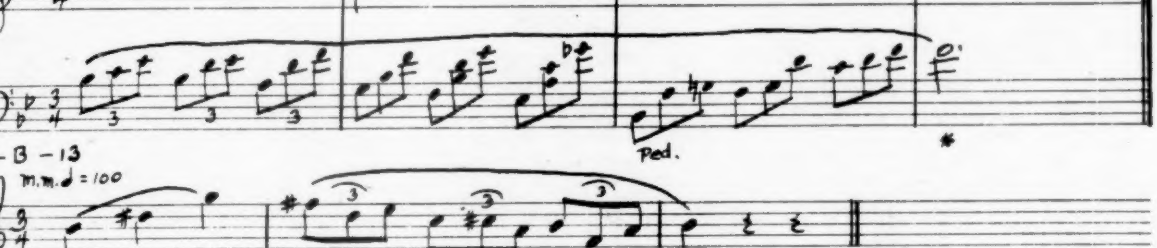
V - B - 10


Meno Mosso
p espress
p subito
f

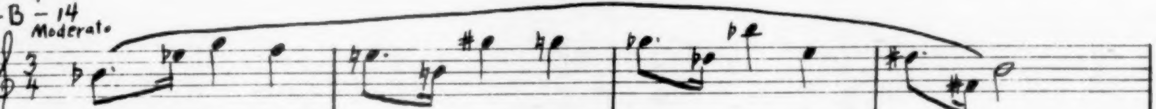
XVI - B - 11


Allegretto
mp

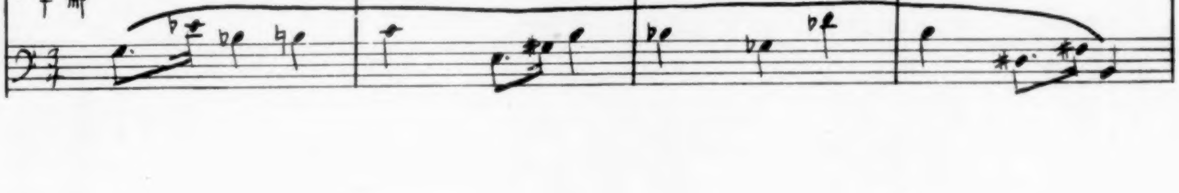
VIII - B - 12


Andante
Ped.
*

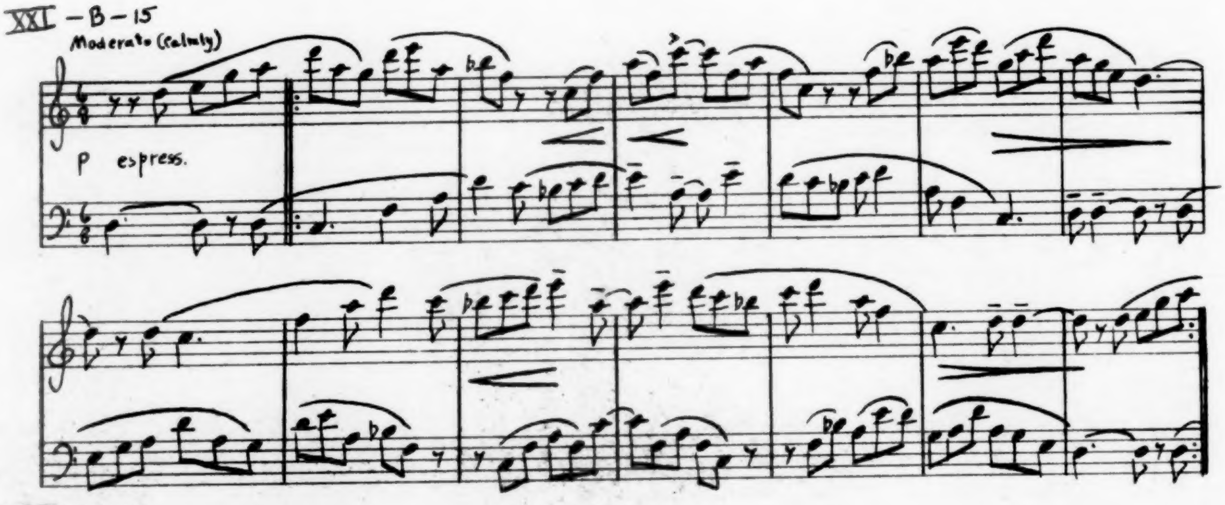
XI - B - 13



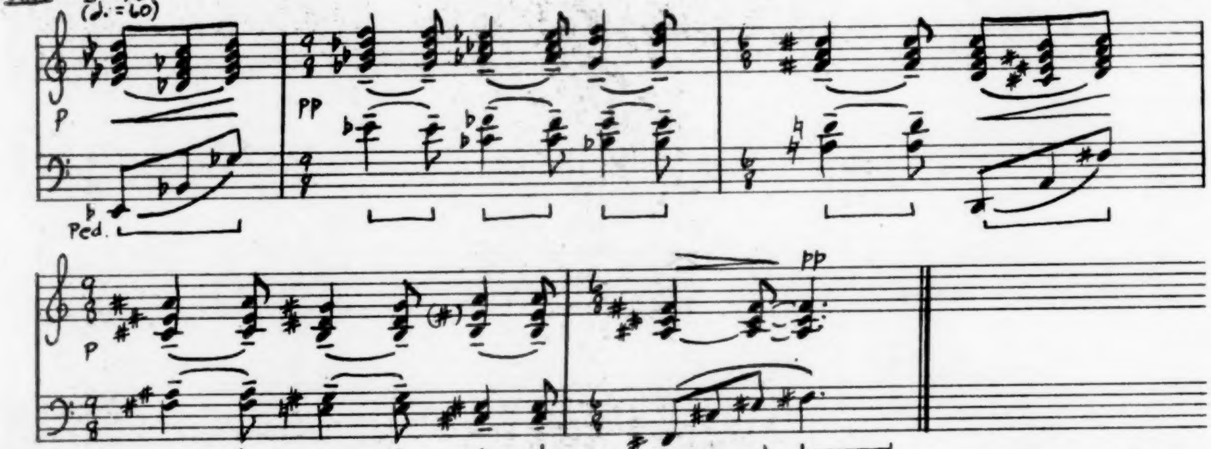
III - B - 14


Moderato
f mf

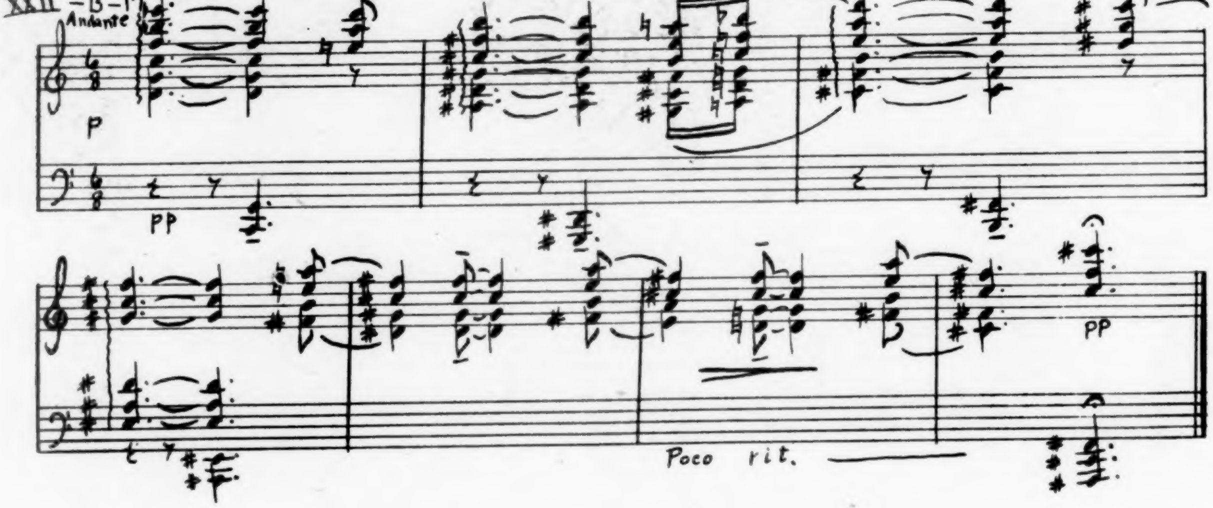
XXI – B – 15


Moderato (Calmly)
p espress.

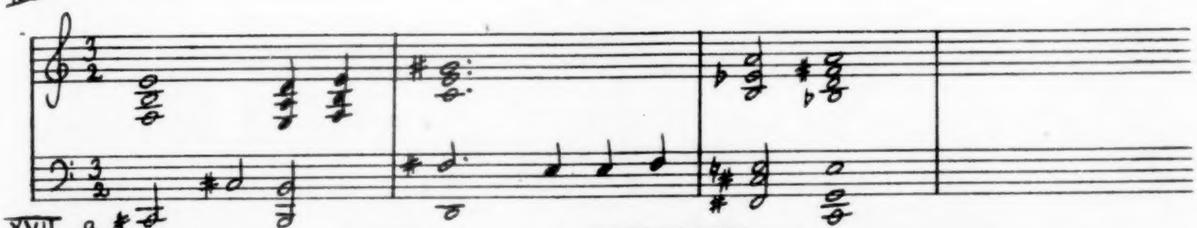
XIX – B – 16


(♩. = 60)
p
Ped.
pp
p
pp

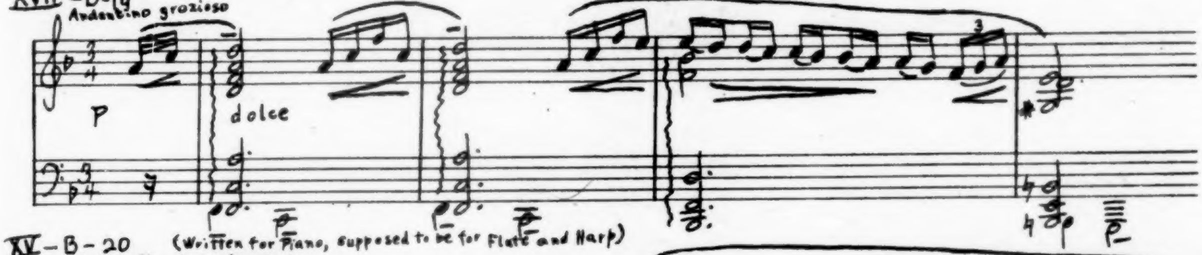
XXII – B – 17


Andante
p
pp
Poco rit.
pp

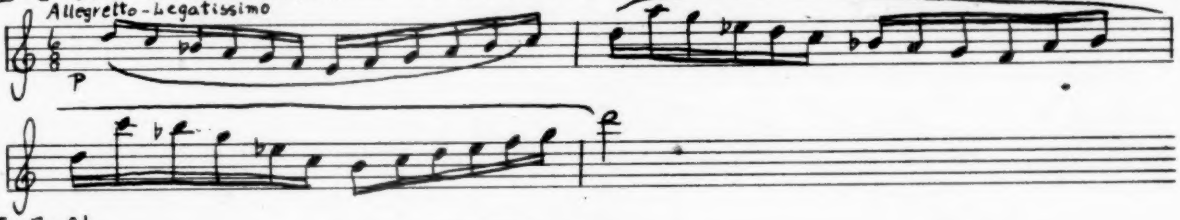
XII -B-18



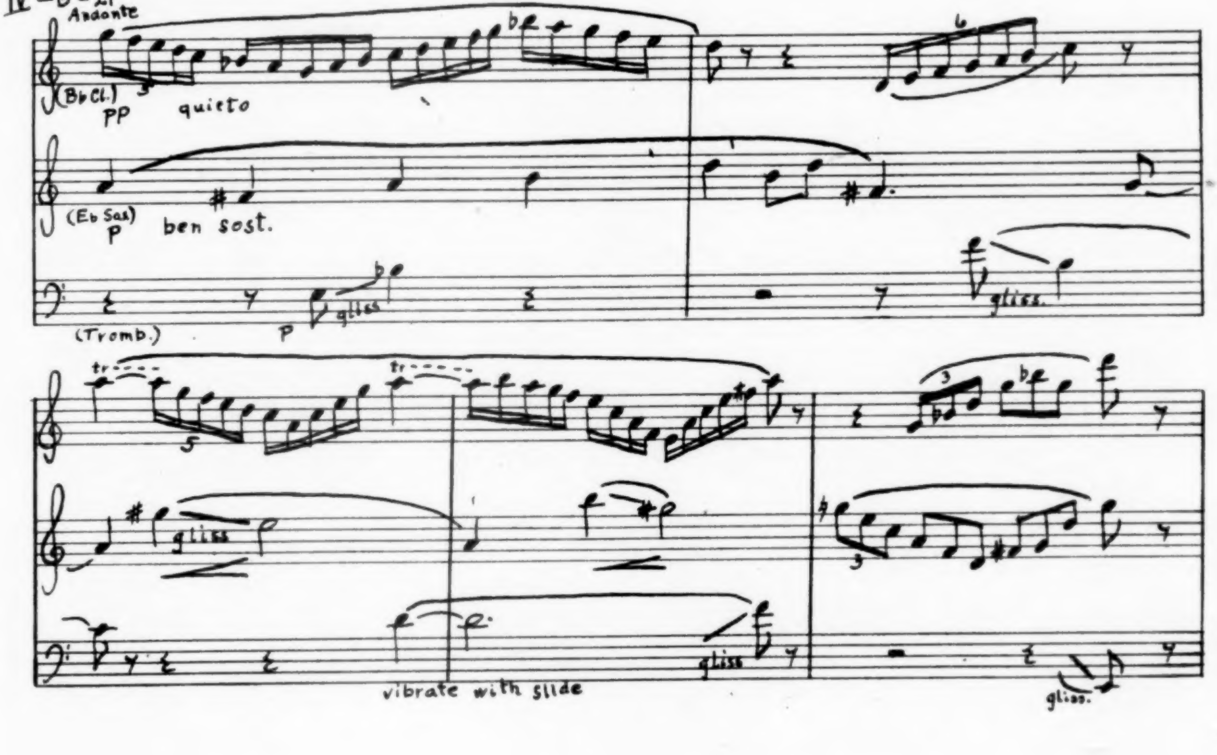
XVII -B-19


Andantino grazioso
p
dolce

XV-B-20 (Written for Piano, supposed to be for Flute and Harp)


Allegretto-Legatissimo
p

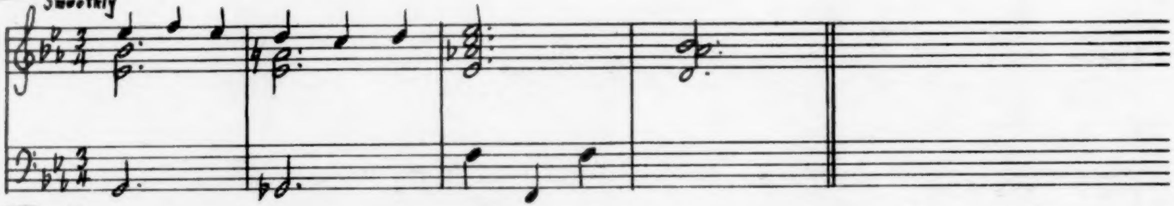
IV-B-21


Andante
(Bb Cl.)
pp
quieto
(Eb Sax)
p
ben sost.
(Tromb.)
p
gliss
gliss.
tr
tr
gliss
vibrate with slide
gliss
gliss.

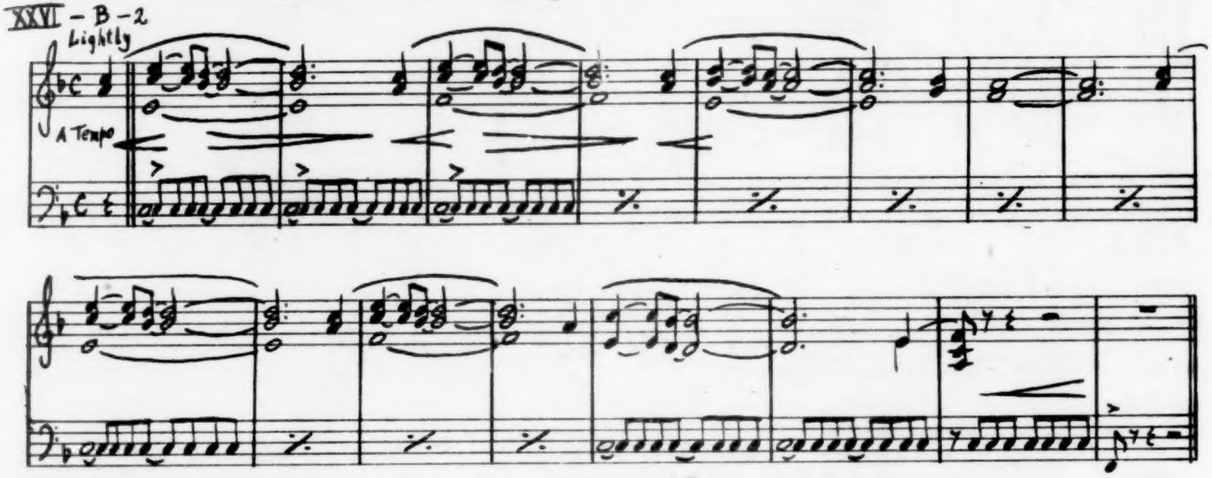
Design B

Popular Composers

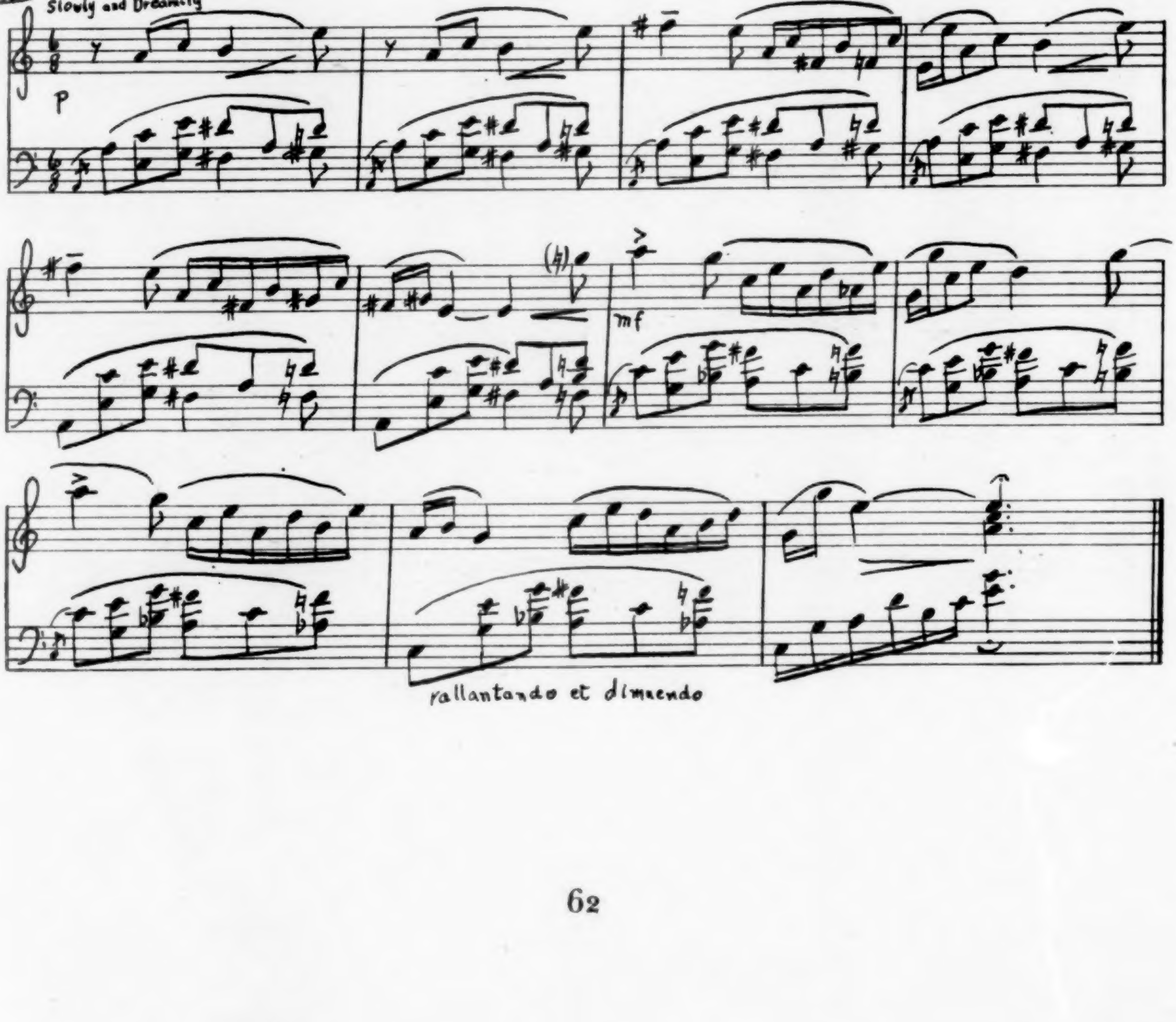
XXX - B-1



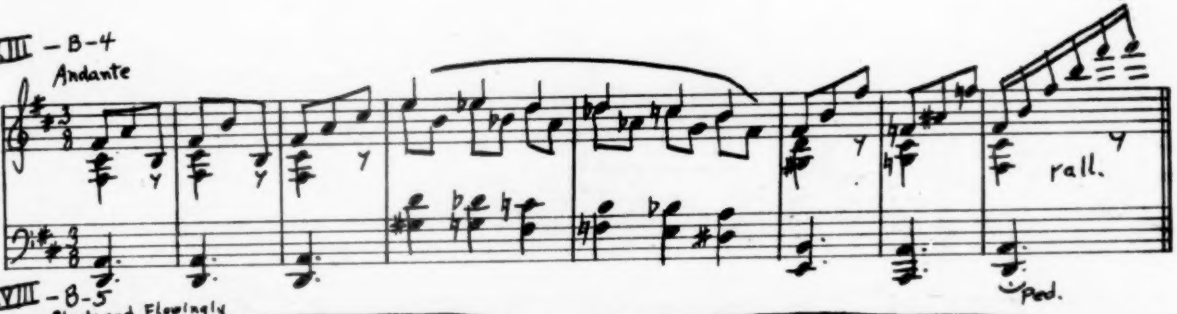
XXVI - B-2


Lightly
A Tempo

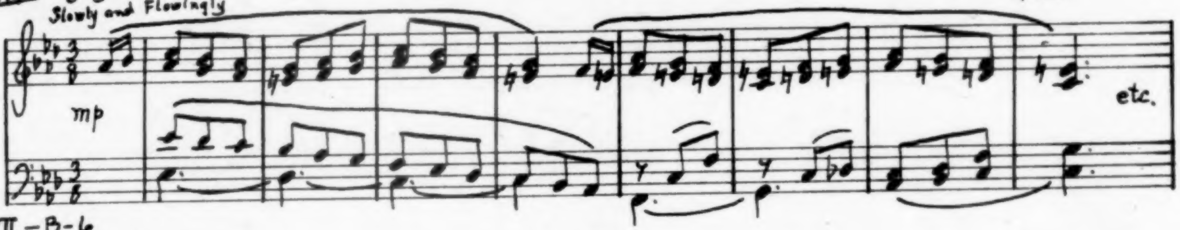
XXXI - B-3


Slowly and Dreamily
p
mf
rallantando et dimuendo

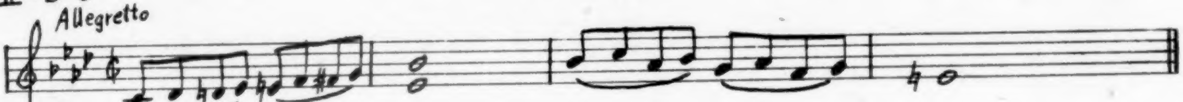
XXIII – B-4


Andante
rall.
Ped.

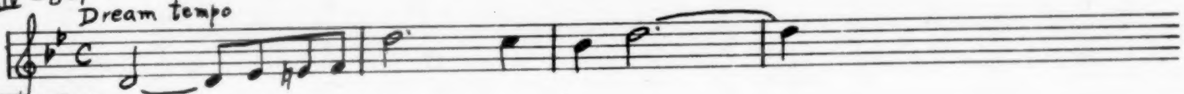
XXVIII – B-5


Slowly and Flowingly
mp
etc.

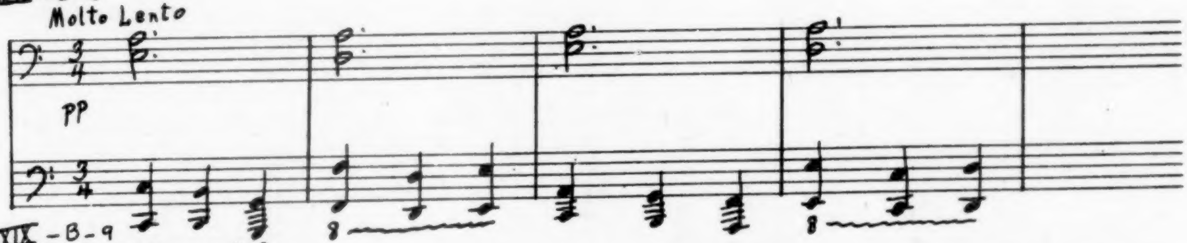
XXVII – B-6


Allegretto

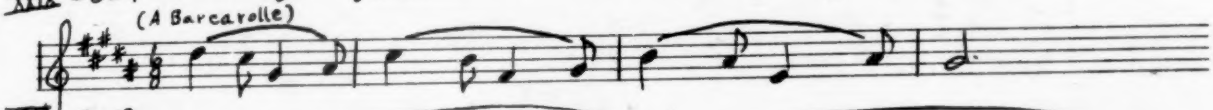
XXIV – B-7


Dream tempo

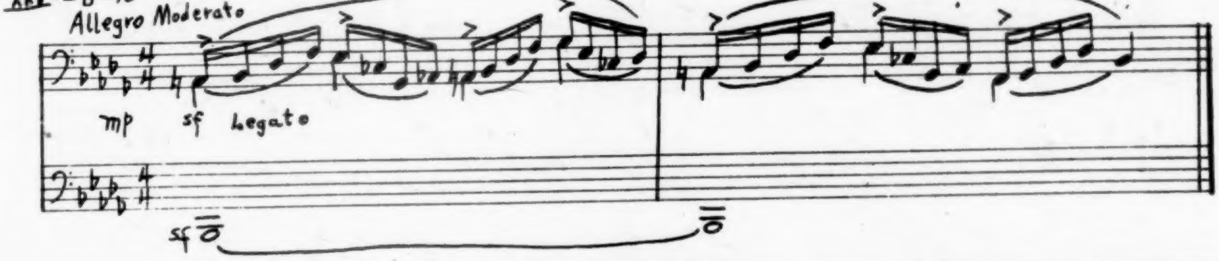
XXXII – B-8


Molto Lento
pp
8
8

XXIX – B-9


(A Barcarolle)

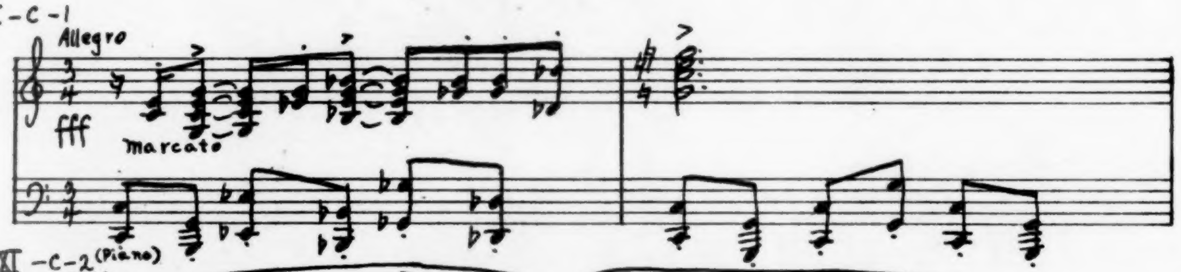
XXV – B-10


Allegro Moderato
mp
sf
Legato
sf

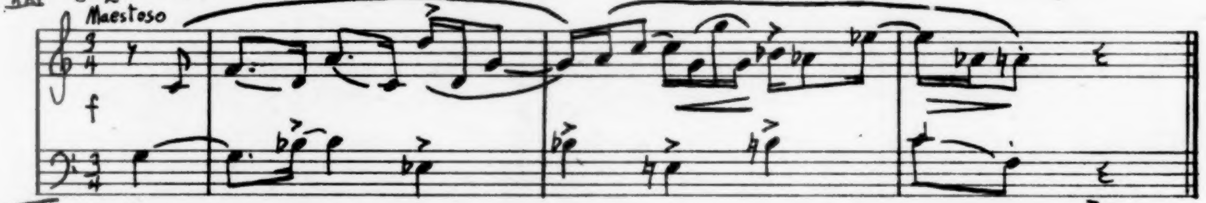
Design C

Standard Composers

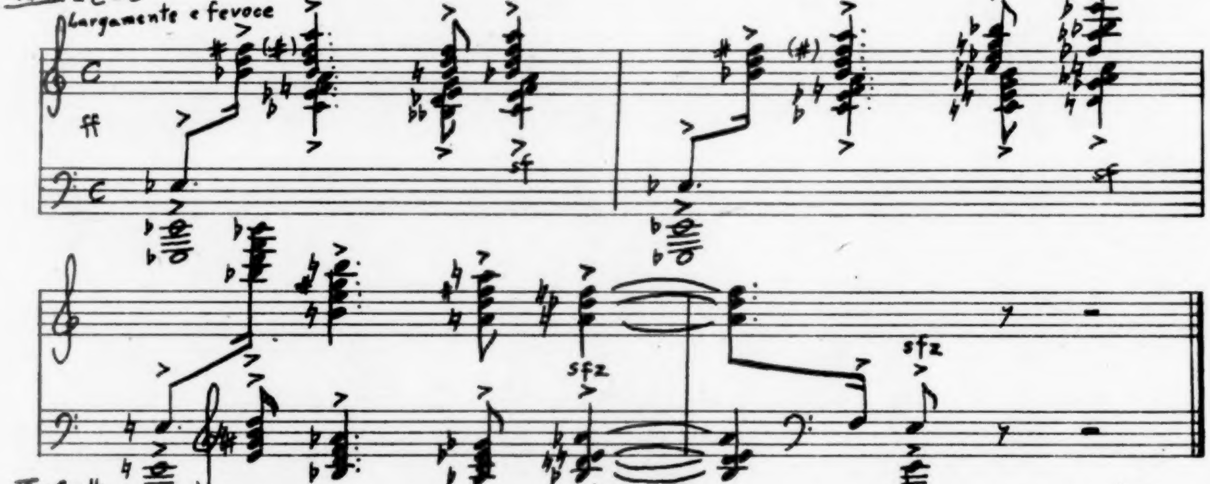
II -C-1


Allegro
fff
marcato

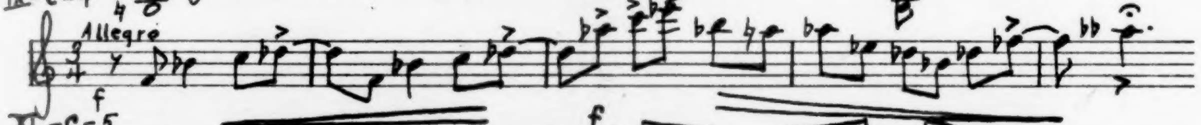
XXI -C-2 (Piano)



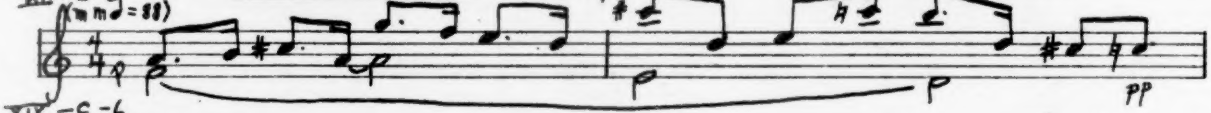
XXII -C-3


Largamente e fevoce
ff
sf
sfz

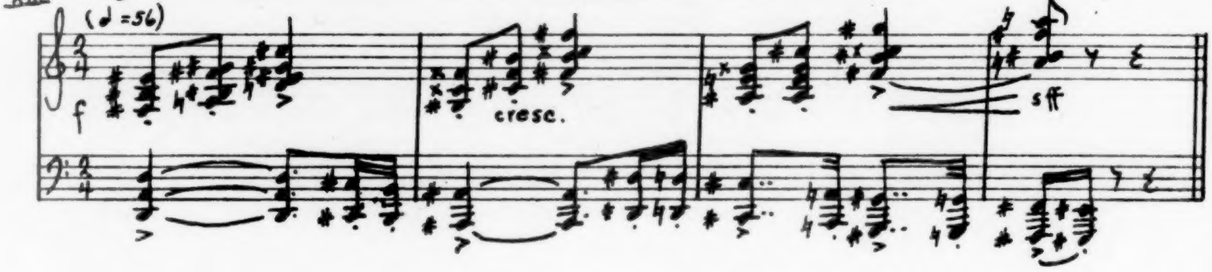
IX-C-4



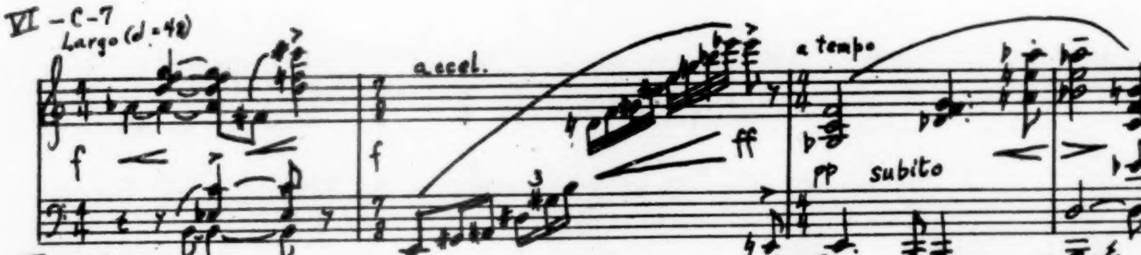
XI -C-5



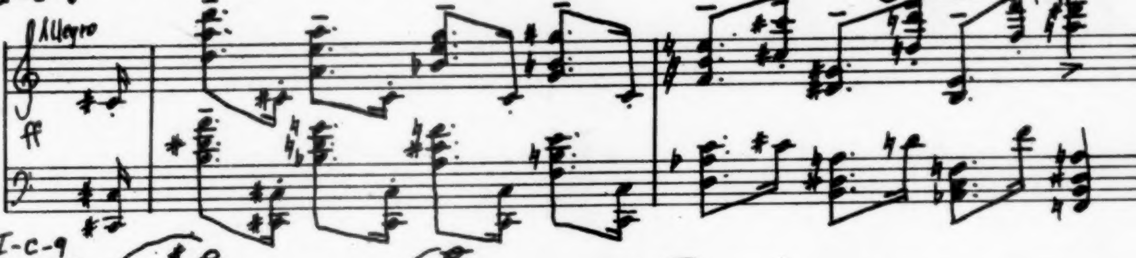
XIX -C-6


(𝅗𝅥 =56)
f
cresc.
sff

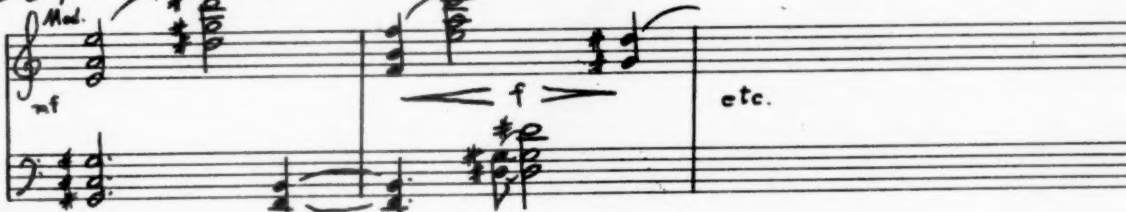
VI - C-7


Largo (𝅗𝅥 = 48)
f
accel.
f
ff
a tempo
pp subito

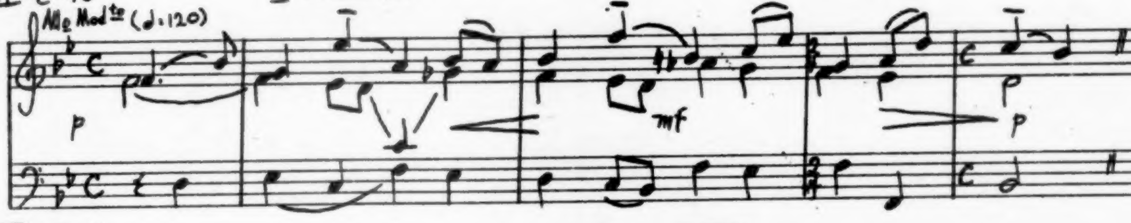
XI - C-8



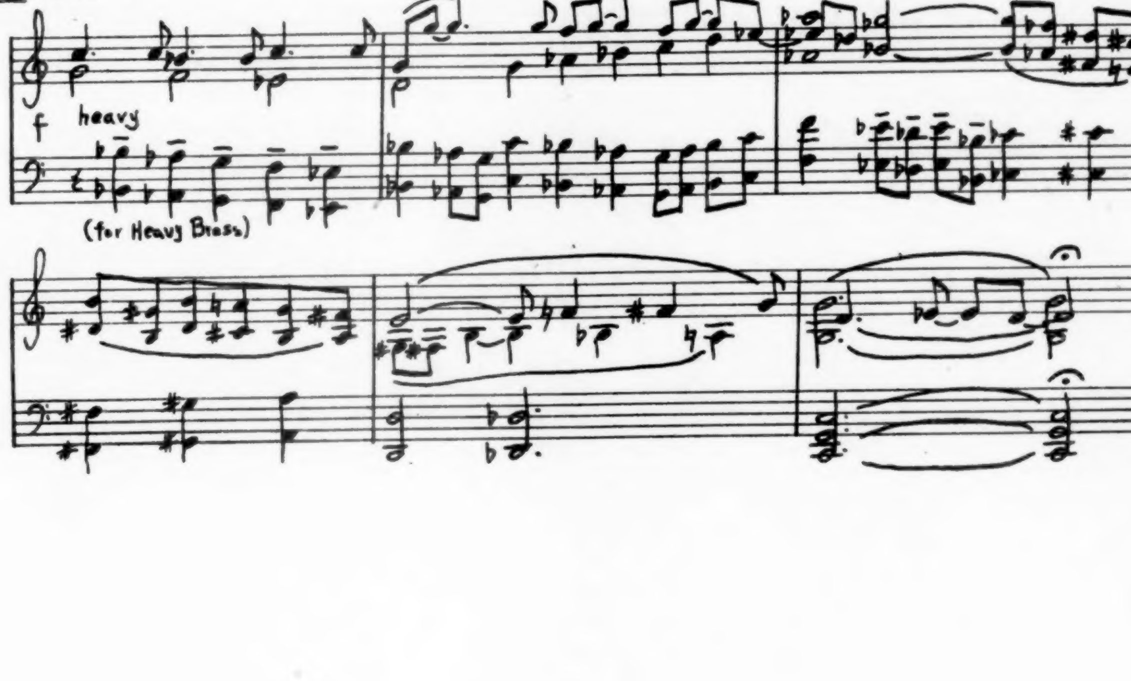
XIV - C-9



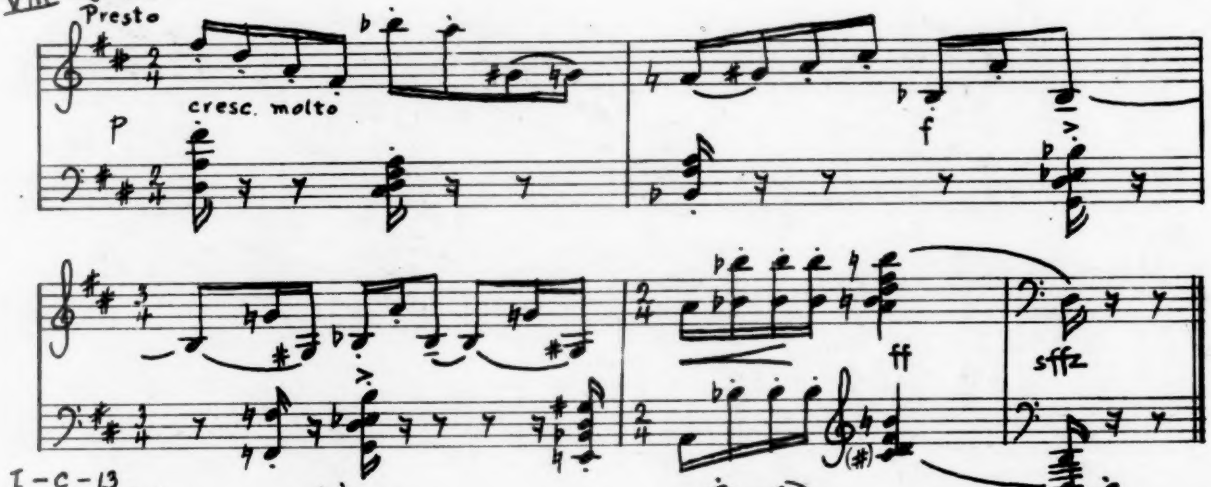
XVI - C-10


Allo Modto (𝅗𝅥 = 120)
p
mf
p

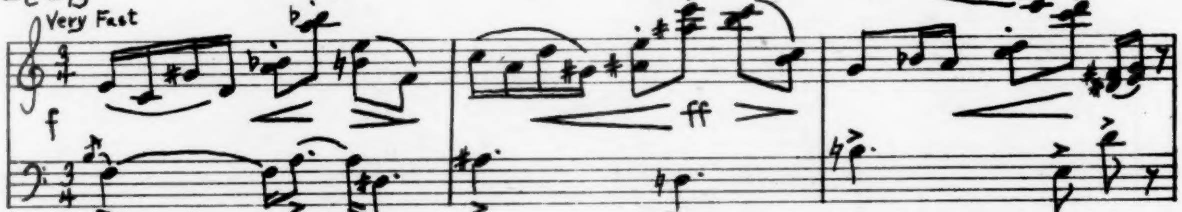
XVIII - C-11


f
heavy
(for Heavy Brass)

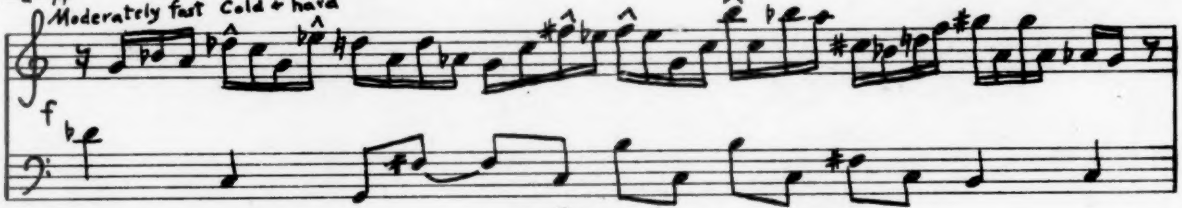
VIII - C - 12


Presto
cresc. molto
p
f
ff
sffz

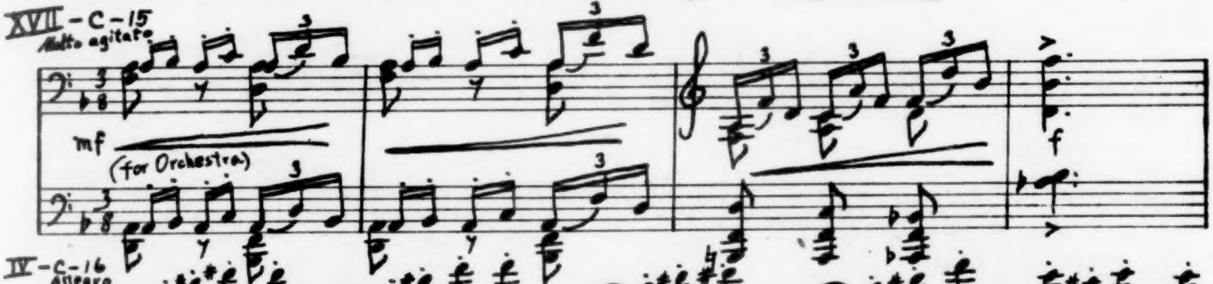
I - C - 13


Very Fast
f
ff

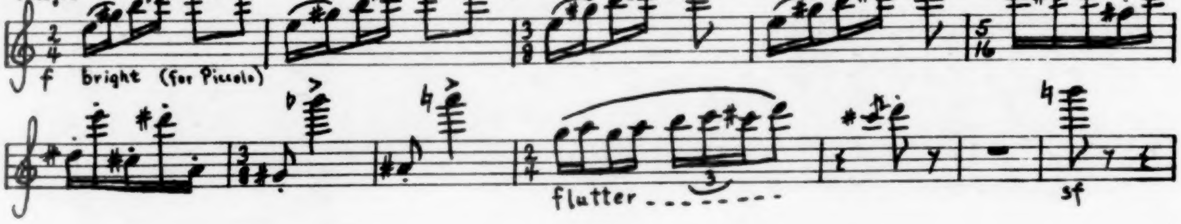
III - C - 14


Moderately fast Cold & hard
f

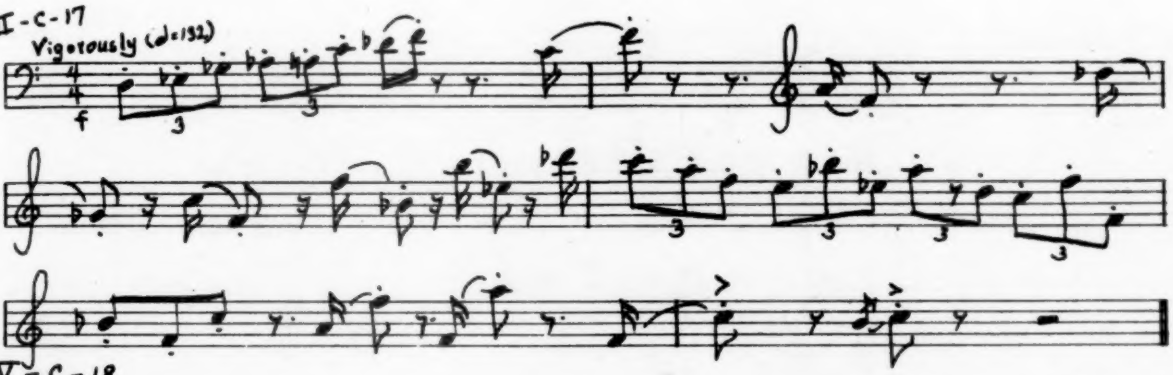
XVII - C - 15


Molto agitato
mf
(for Orchestra)
3
f

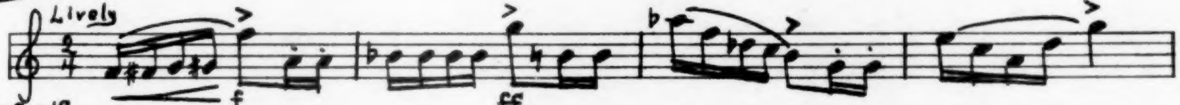
IV - C - 16


Allegro
f
bright (for Piccolo)
3
flutter
sf

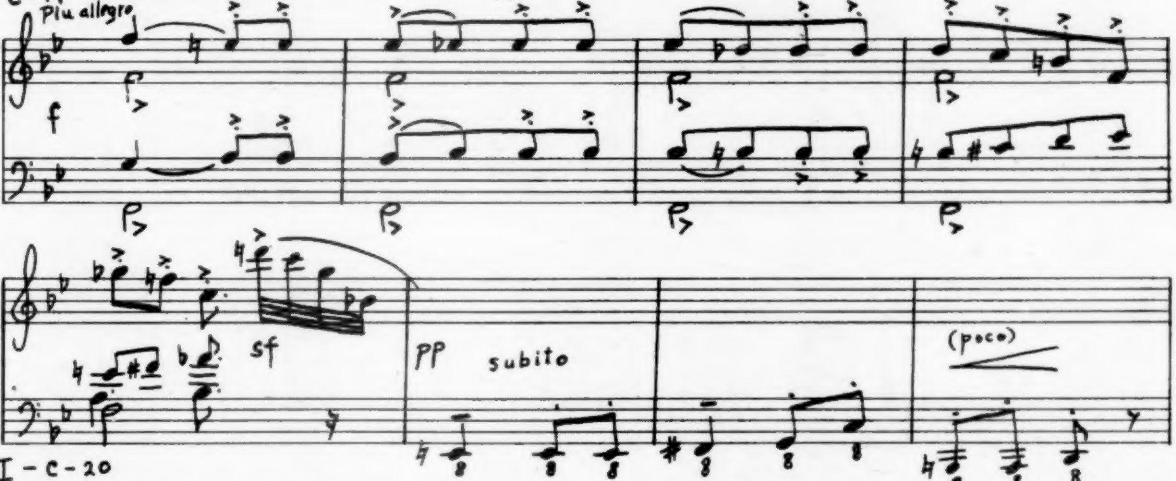
VII - C - 17


Vigorously (𝅗𝅥=132)
f
3

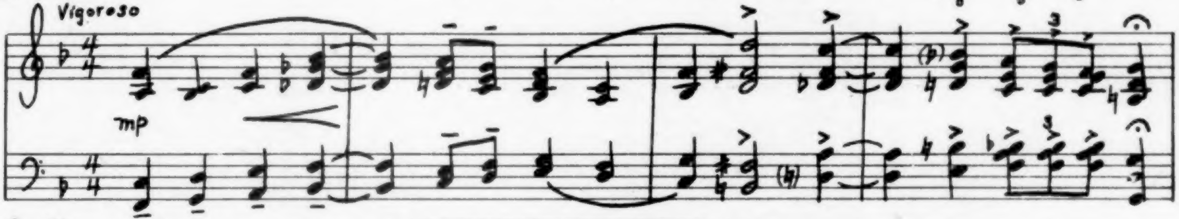
XV - C - 18



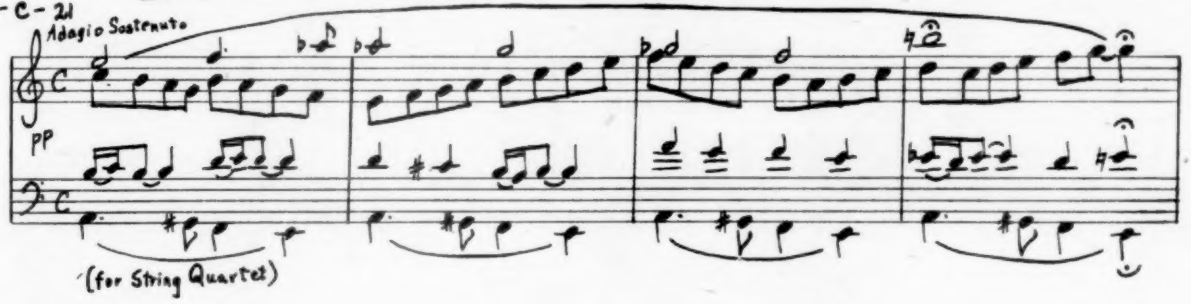
V - C - 19


Piu allegro
f
sf
pp subito
(poco)

XIII - C - 20


Vigoroso
mp
3

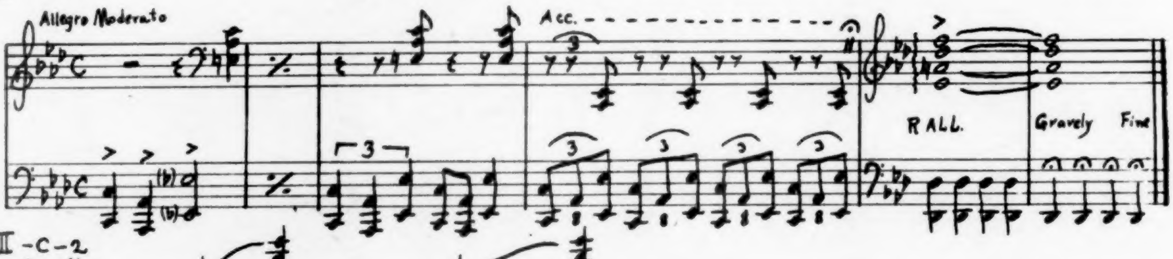
X - C - 21


Adagio Sostenuto
pp
(for String Quartet)

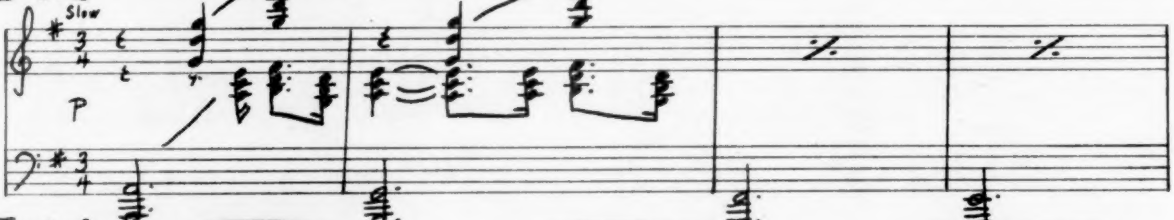
Design C

Popular Composers

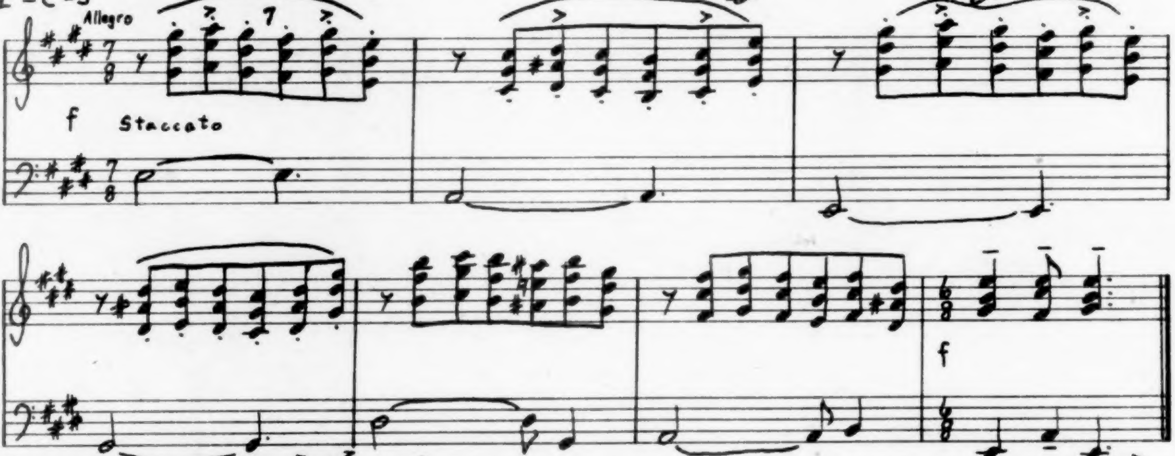
XXIII - C - 1


Allegro Moderato
Acc.
RALL.
Gravely
Fine

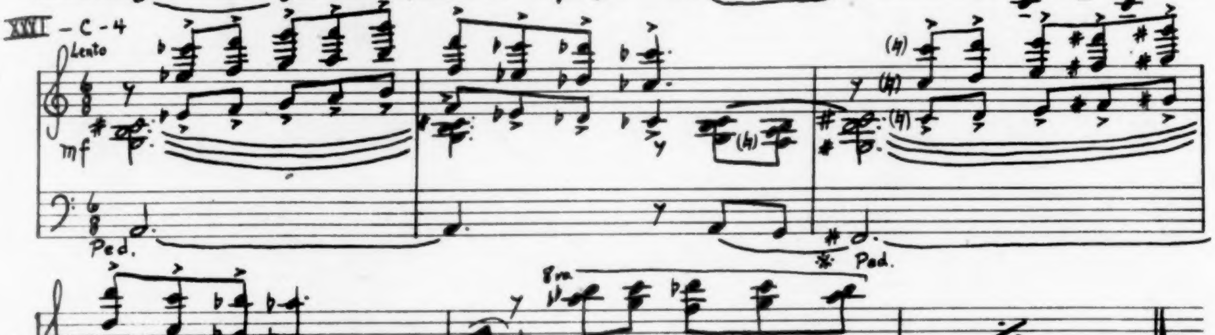
XXIV - C - 2



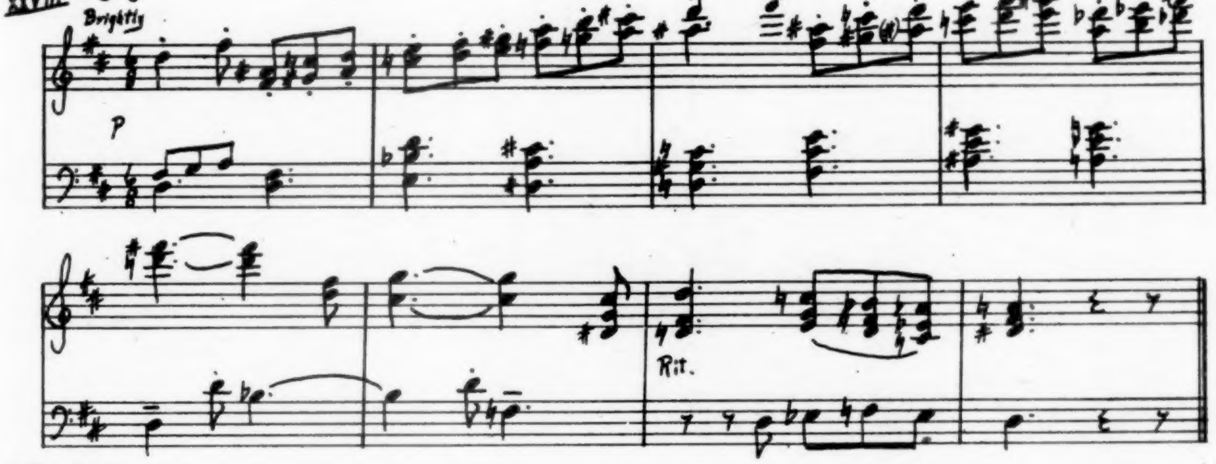
XXV - C - 3


Allegro
f
Staccato
f

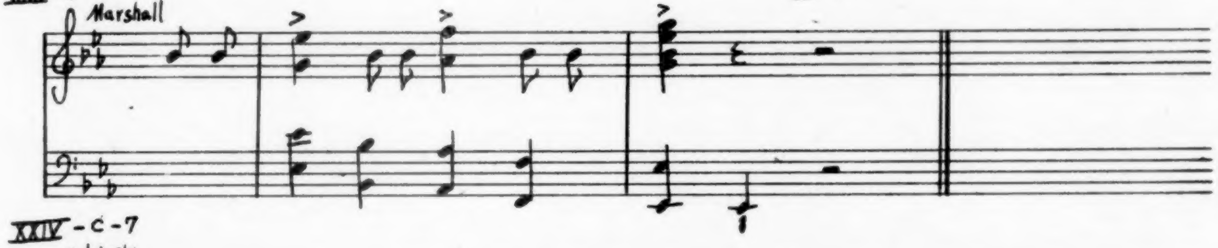
XXVI - C - 4


Lento
mf
Ped.
Ped.
Ped.
8va
8va

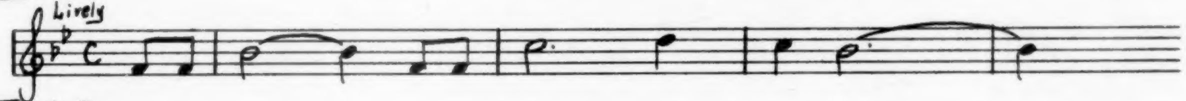
XXVIII - C-5


Brightly
p
Rit.

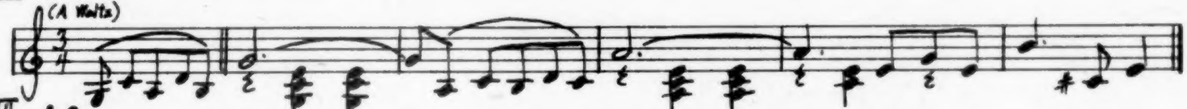
XXX - C-6



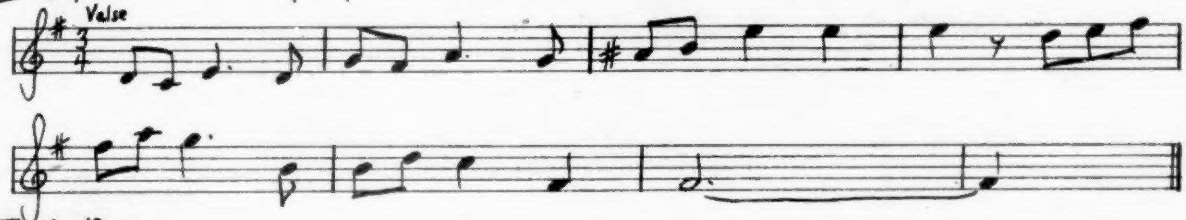
XXIV - C-7



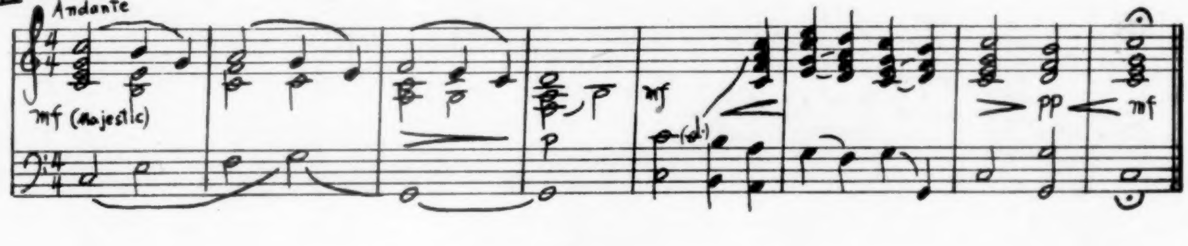
XXIX - C-8



XXVII - C-9



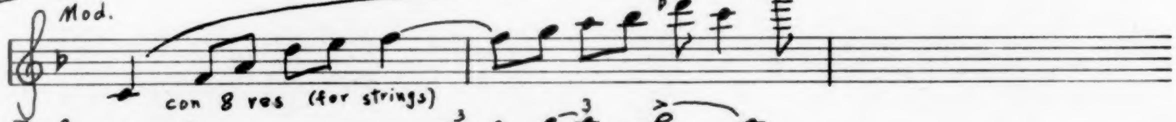
XXVI - C-10


Andante
mf (Majestic)
p
mf
(a)
pp
mf

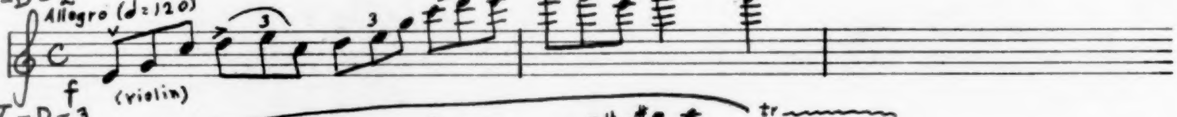
Design D

Standard Composers

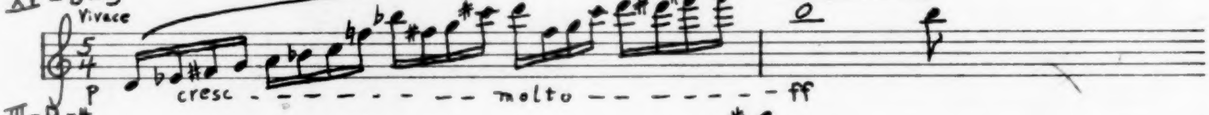
XIV – D - 1


Mod.
con 8 ves (for strings)

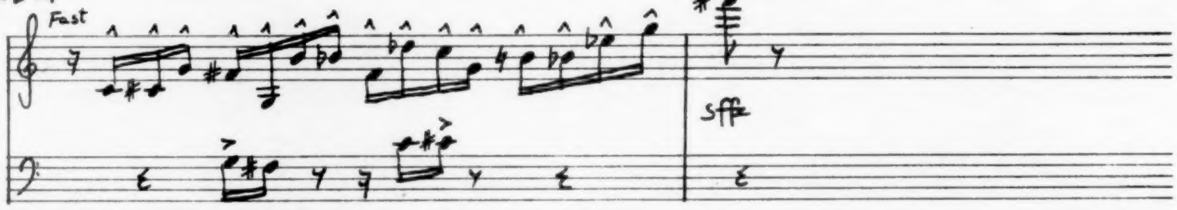
II - D - 2


Allegro (𝅗𝅥=120)
f
(violin)
3

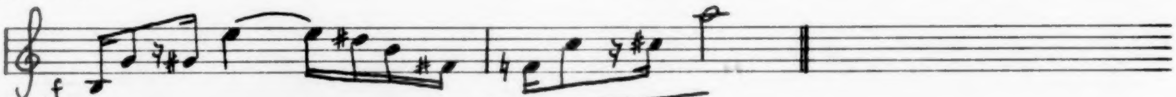
XV - D - 3


Vivace
p
cresc - - - - - - - - - molto - - - - - - - ff
tr

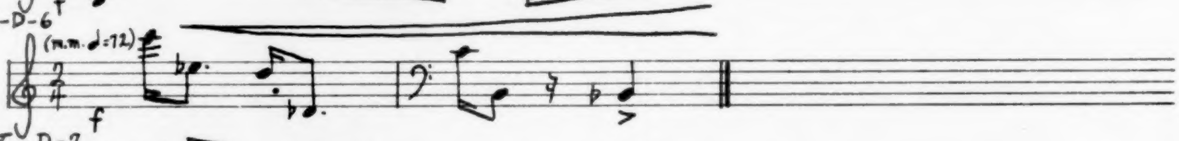
III - D - 4



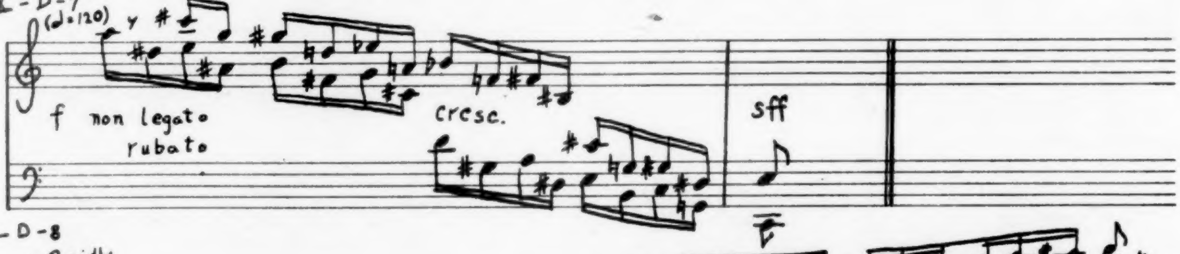
XVIII - D - 5



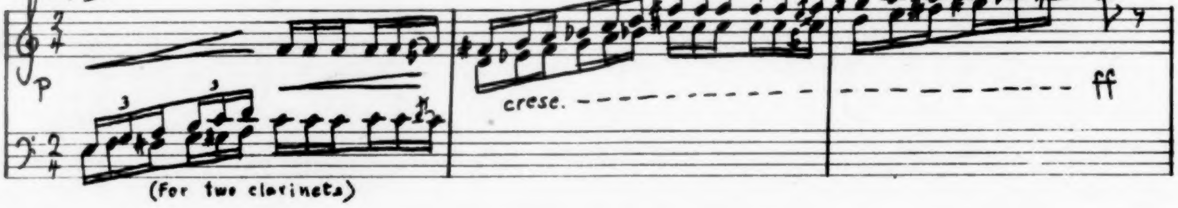
XI - D - 6



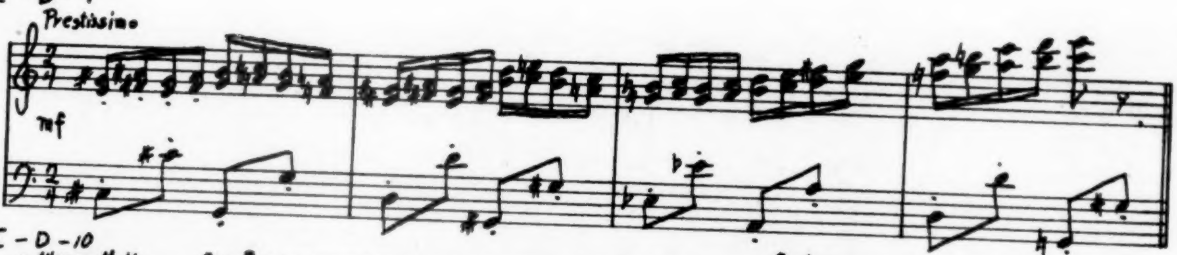
XIX - D - 7


(𝅗𝅥=120)
f non legato
rubato
cresc.
sff

I - D - 8

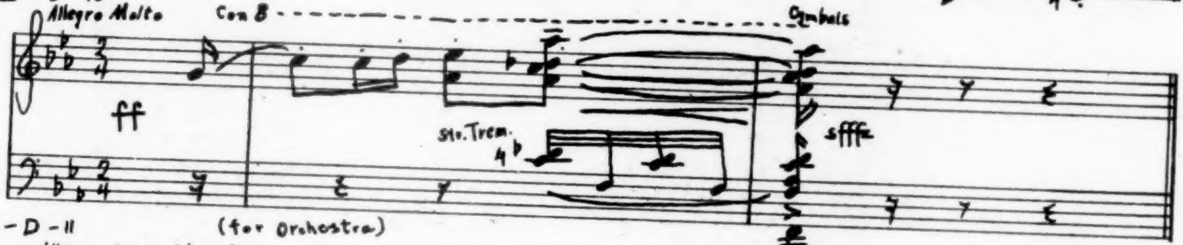

Rapidly
p
3
cresc. - ff
(For two clarinets)

XII - D - 9



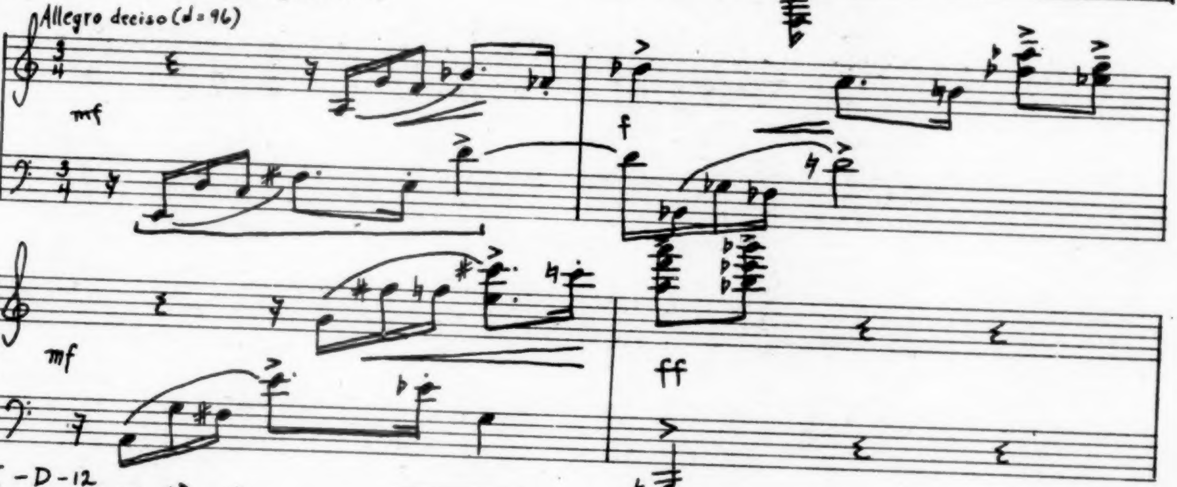
Prestissimo
mf

VIII - D - 10



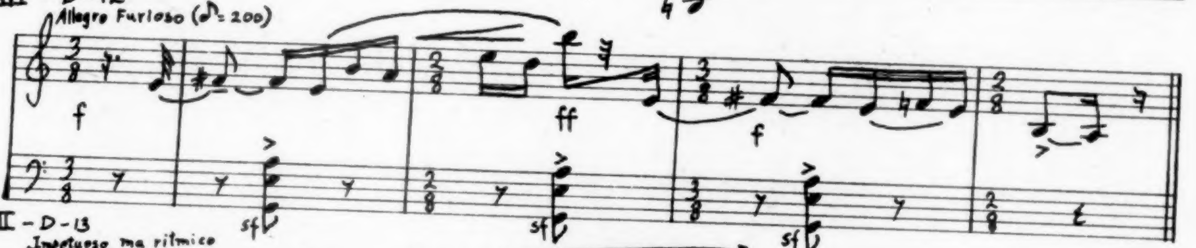
Allegro Molto
Con 8
Cymbals
ff
Str. Trem.
sfffz

VI - D - 11 (for Orchestra)



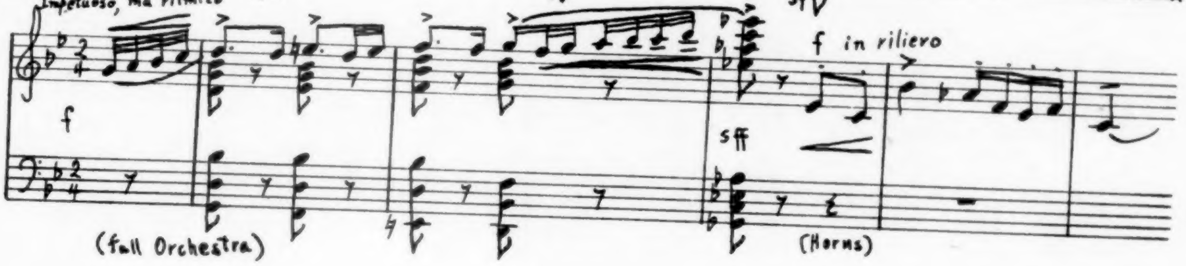
Allegro deciso (♩= 96)
mf
f
mf
ff

XVI - D - 12



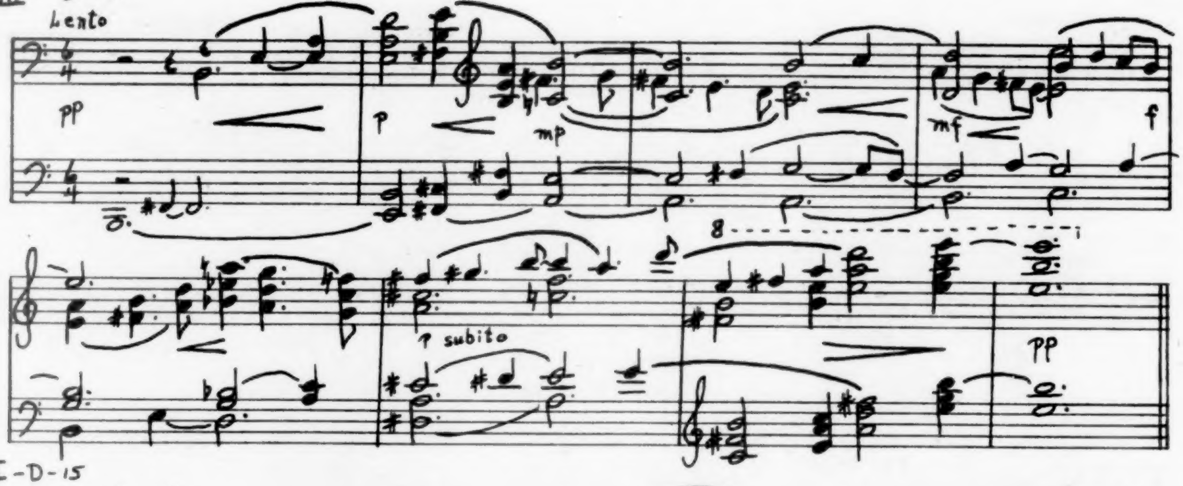
Allegro Furioso (♪= 200)
f
ff
f
sf
sf
sf

XVII - D - 13

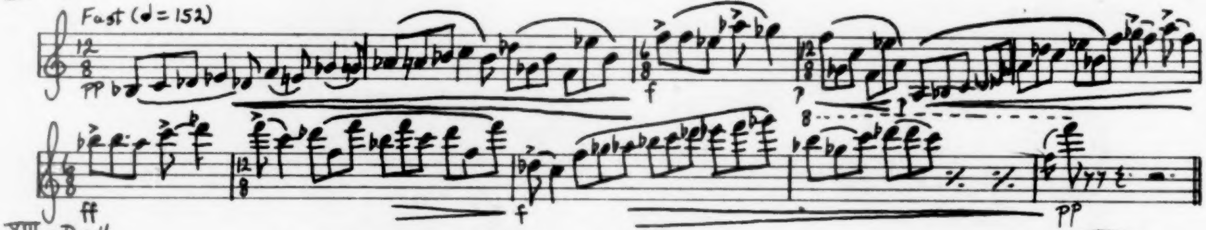


Impetuoso, ma ritmico
f
sff
f in riliero
(full Orchestra)
(Horns)

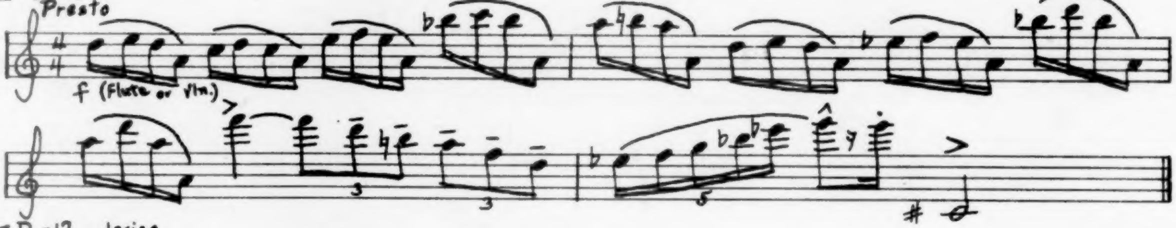
XII - D - 14


Lento
pp
p
mp
mf
f
8
p subito
pp

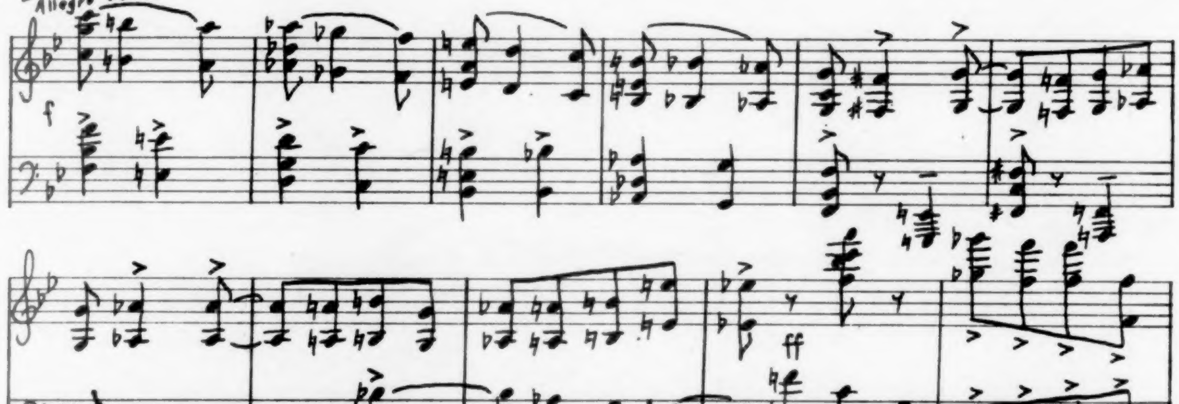
VII - D - 15


Fast (𝅗𝅥 = 152)
pp
f
p
8
ff
f
pp

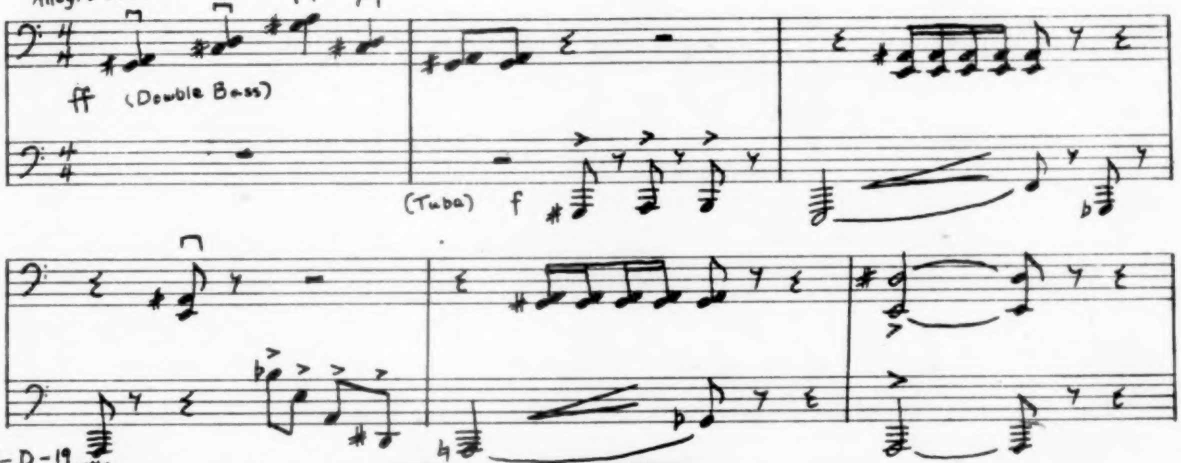
XIII - D - 16


Presto
f (Flute or Vln.)
3
3
5

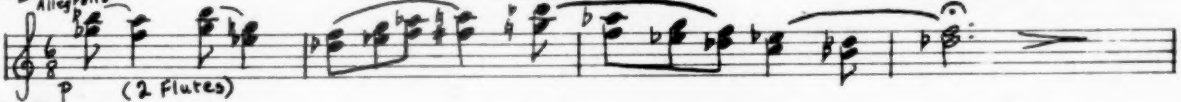
V - D - 17


Allegro deciso
f
ff

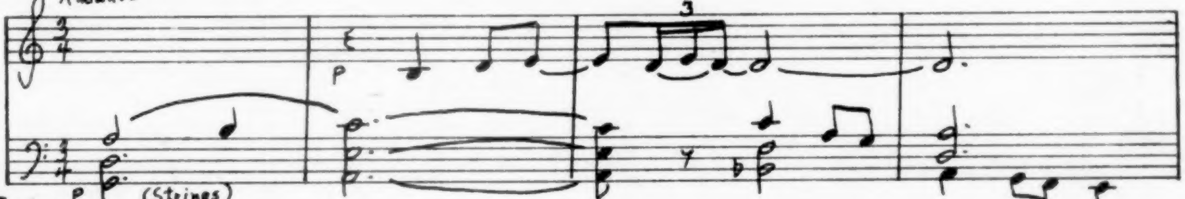
IV - D - 18
Allegro Mod^to


ff
(Double Bass)
(Tuba)
f

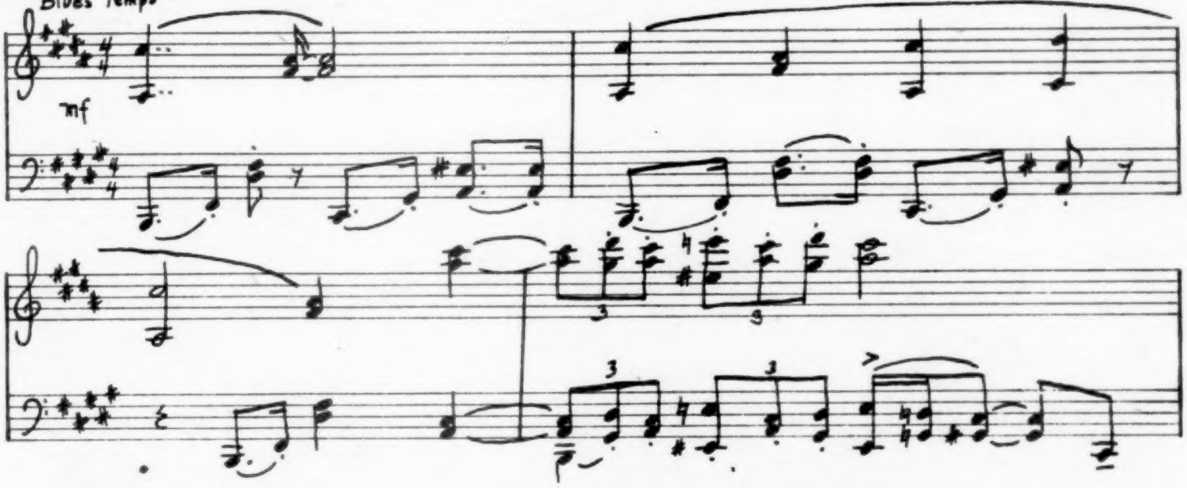
X - D - 19
Allegretto



IX - D - 20
Andante


p
3
p
(Strings)

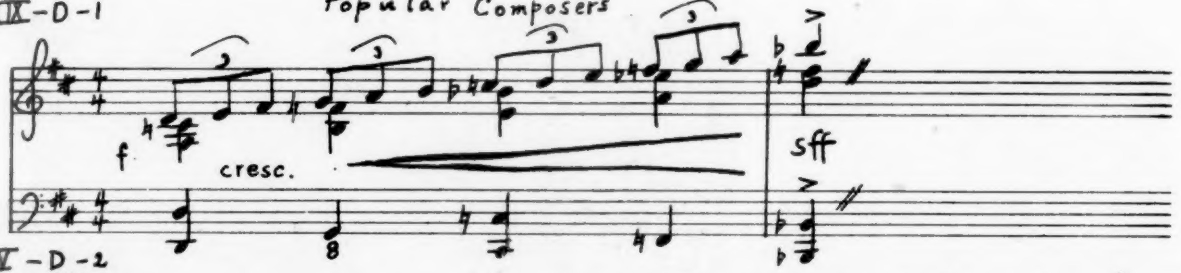
XXI - D - 21
Blues Tempo



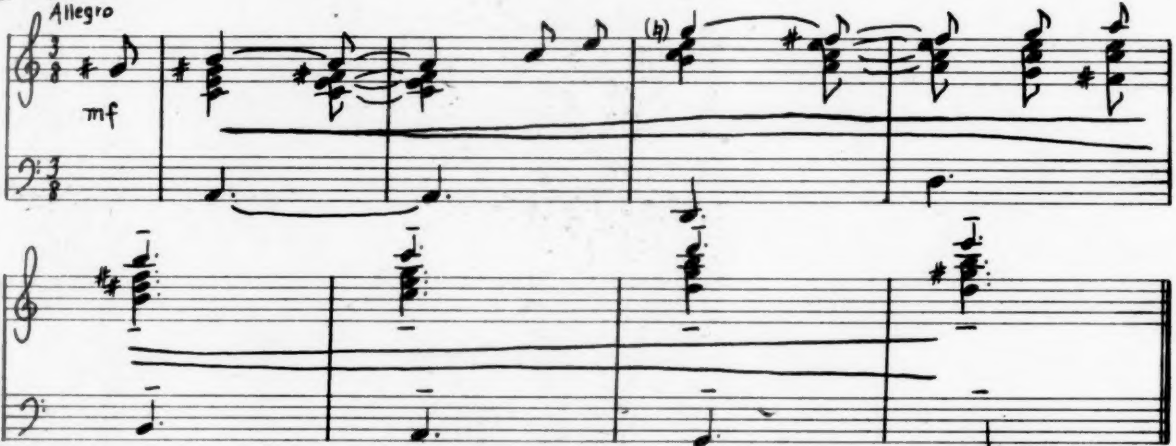
Design D

Popular Composers

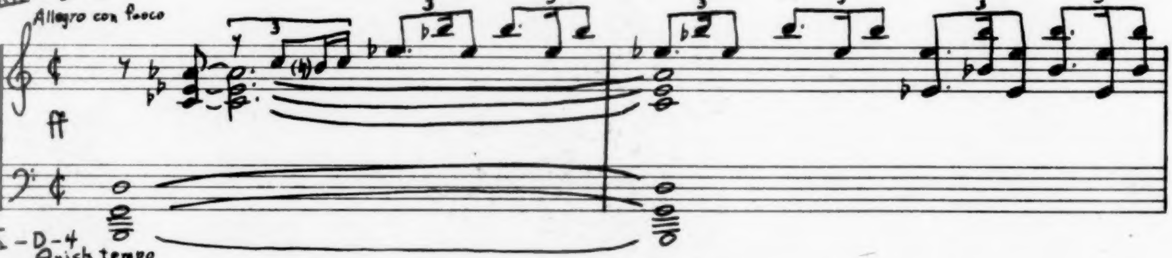
XXIX - D - 1



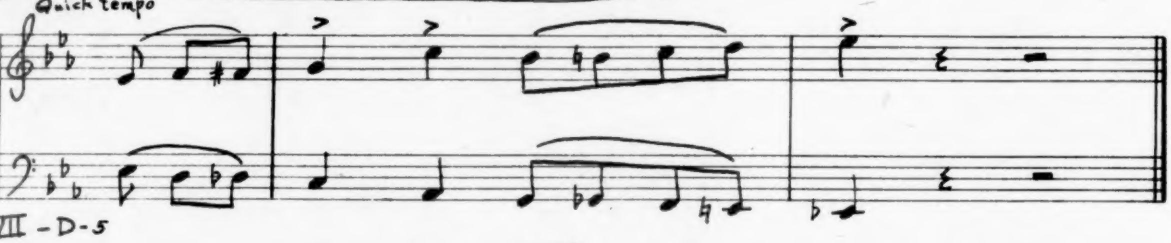
XXV - D - 2



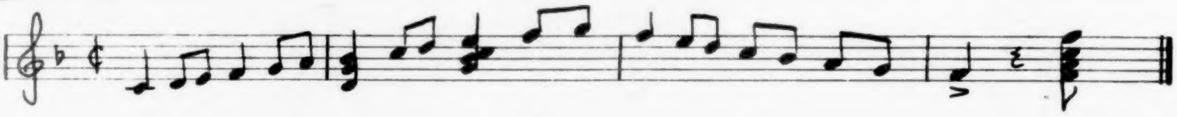
XXXII - D - 3


Allegro con Poco
ff

XXX - D - 4

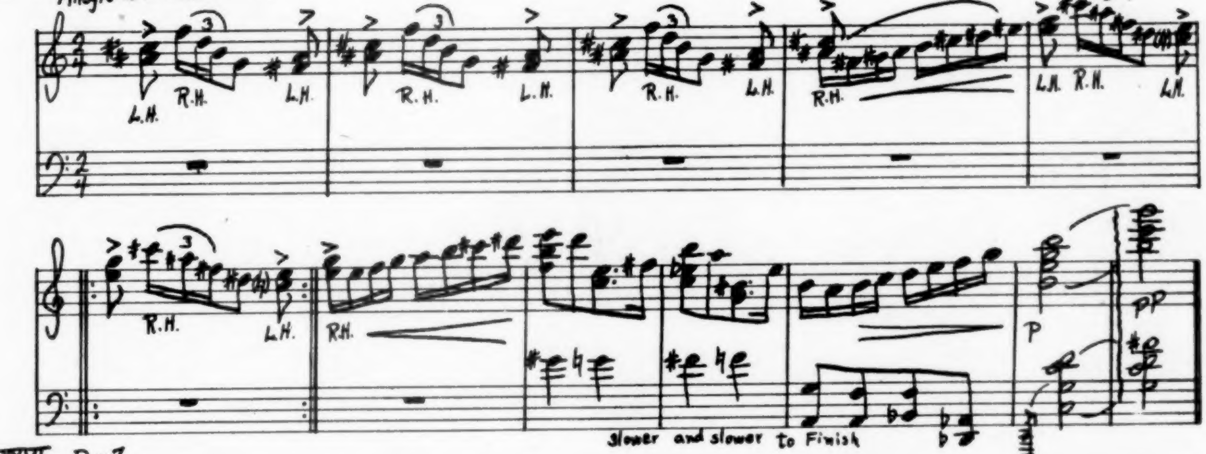

Quick tempo

XXVII - D - 5



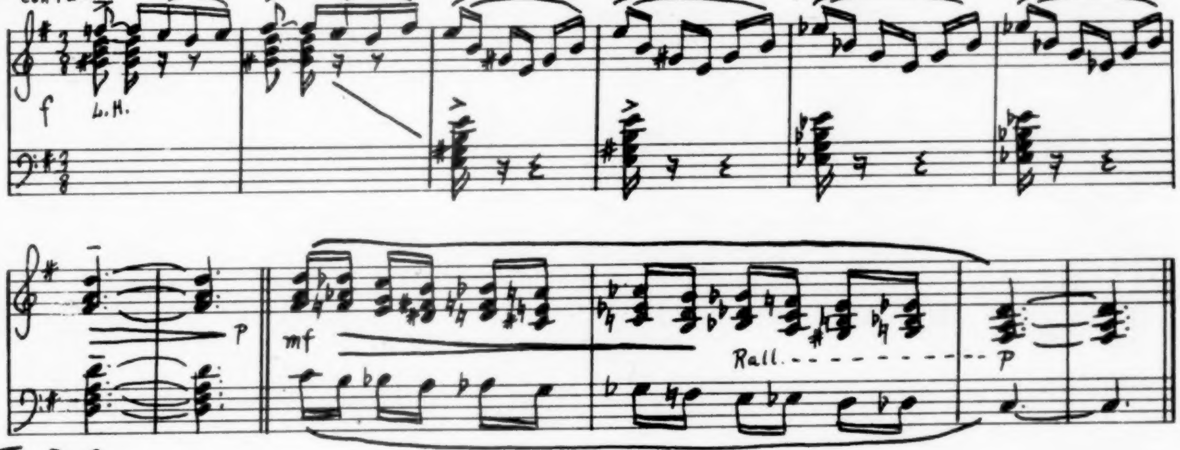
XXXI - D - 6

Allegro (left hand staccato)


L.H.
R.H.
L.H.
R.H.
L.H.
R.H.
L.H.
R.H.
L.H.
R.H.
L.H.
R.H.
L.H.
R.H.
p
pp
slower and slower to Finish

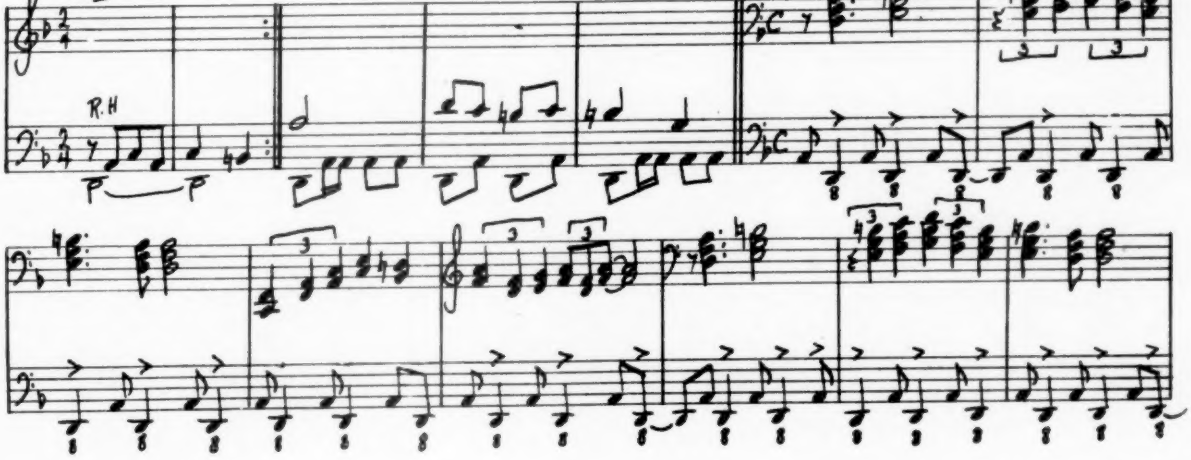
XXVI - D - 7

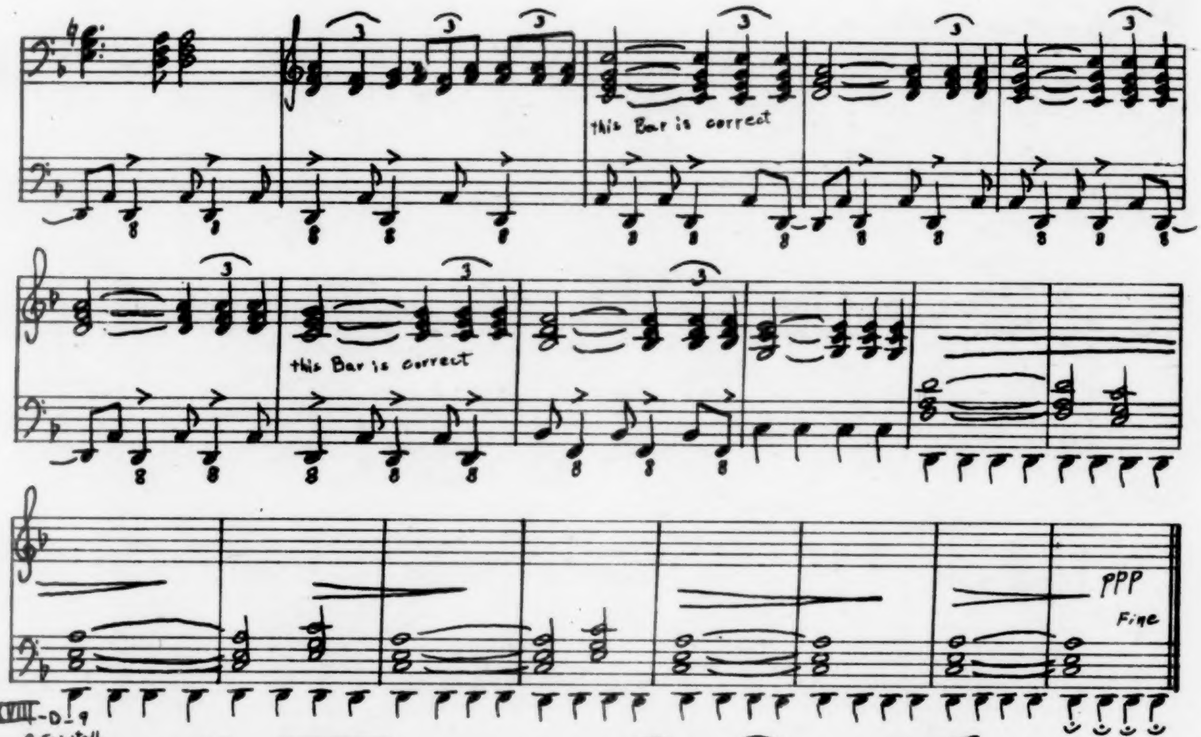
Con Fuoco


f
L.H.
p
mf
Rall.
p

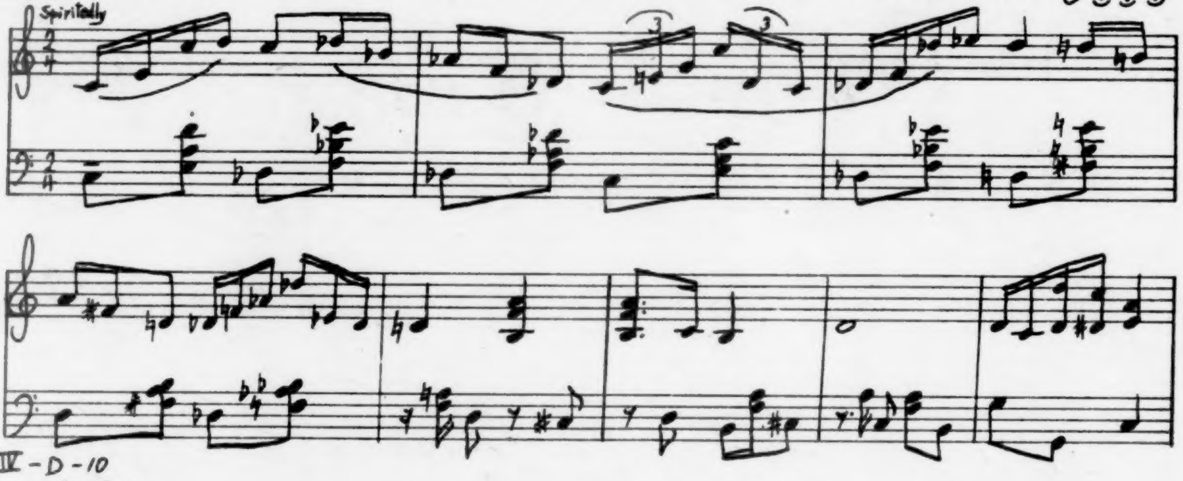
XXIII - D - 8

Slowly

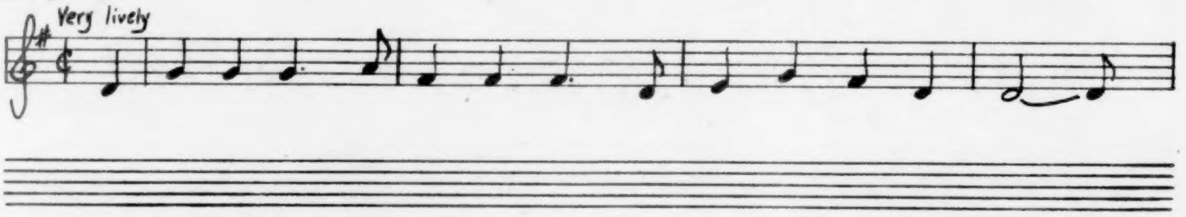



this Bar is correct
this Bar is correct
ppp
Fine

XXIII - D - 9


Spiritedly

XXIV - D - 10


Very lively

AMERICAN PSYCHOLOGICAL PERIODICALS

American Journal of Psychology—Ithaca, N.Y.; Cornell University. Subscription $6.50. [illegible] pages annually. Edited by K. M. Dallenbach, Madison Bentley, and E. G. Boring. Quarterly. General and experimental psychology. Founded [illegible].

Journal of Genetic Psychology—Provincetown, Mass.; The Journal Press. Subscription $14.00 per annum (2 volumes). 1000 pages annually. Edited by Carl Murchison. Quarterly. Child behavior, animal behavior, and comparative psychology. Founded 1891.

Psychological Review—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $5.50. 540 pages annually. Edited by Herbert S. Langfeld. Bi-monthly. General psychology. Founded 1894.

Psychological Monographs—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $6.00 per volume. 500 pages. Edited by John F. Dashiell. Without fixed dates, each issue one or more researches. Founded 1895.

Psychological Bulletin—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $7.00. [illegible] pages annually. Edited by John E. Anderson. Monthly (10 numbers). Psychological literature. Founded 1904.

Archives of Psychology—New York, N.Y.; Columbia University. Subscription $6.00 per volume. [illegible] pages. Edited by R. S. Woodworth. Without fixed dates, each number a single experimental study. Founded 1906.

Journal of Abnormal and Social Psychology—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $5.00. 560 pages annually. Edited by Gordon W. Allport. Quarterly. Founded 1906.

Journal of Educational Psychology—Baltimore, Md.; Warwick & York. Subscription $6.00. [illegible] pages annually. Edited by J. W. Dunlap, P. M. Symonds, and H. E. Jones. Monthly except June to August. Founded 1910.

Psychoanalytic Review—New York, N.Y.; 64 West 56th St. Subscription $6.00. 500 pages annually. Edited by Smith Ely Jelliffe. Quarterly. Founded 1913.

Journal of Experimental Psychology—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $7.00 per annum. 625 pages annually. Edited by Samuel [illegible] Fernberger. Monthly. Founded [illegible].

Journal of Applied Psychology—Northwestern University, Evanston, Ill. Subscription [illegible]. [illegible] pages annually. Edited by Donald G. [illegible]. Bi-monthly. Founded 1917.

Journal of Comparative Psychology—Baltimore, Md.; Williams & Wilkins Co. Subscription [illegible] per annum. 500 pages annually. Edited by Roy M. Dorcus. Bi-monthly. Founded 1921.

Comparative Psychology Monographs—Baltimore, Md.; Williams & Wilkins Co. Subscription [illegible] per volume. 400 pages. Edited by Roy M. Dorcus. Without fixed dates, each number a single research. Founded 1922.

Genetic Psychology Monographs—Provincetown, Mass.; The Journal Press. Subscription $7.00. [illegible] pages annually. Edited by Carl Murchison. Bi-monthly. Each number one complete research. Child behavior, animal behavior, and comparative psychology. Founded 1925.

Psychological Abstracts—Northwestern University, Evanston, Ill.; American Psychological Association, Inc. Subscription $7.00. [illegible] pages annually. Edited by Walter S. Hunter and H. [illegible] Ansbacher. Monthly. Abstracts of psychological literature. Founded 1927.

Journal of General Psychology—Provincetown, Mass.; The Journal Press. Subscription [illegible] per annum (2 volumes). 1000 pages annually. Edited by Carl Murchison. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

Journal of Social Psychology—Provincetown, Mass.; The Journal Press. Subscription $7.00. [illegible] pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

Psychoanalytic Quarterly—Albany, N.Y.; 372-374 Broadway. Subscription $6.00. 560 pages annually. Edited by Bertram D. Lewin and others. Quarterly. Founded 1932.

Character and Personality—Durham, N.C.; Duke University Press. Subscription [illegible]. [illegible] pages annually. Edited by Karl Zener. Quarterly. Founded 1932.

Journal of Psychology—Provincetown, Mass.; The Journal Press. Subscription $14.00 per [illegible]. 800-1200 pages annually. Edited by Carl Murchison. Quarterly. Founded 1936.

Psychometrika—University of [illegible], Ill.; Psychometric Society. Subscription $10.00. [illegible] pages annually. Edited by L. L. Thurstone and others. Quarterly. Quantitative methods in psychology. Founded 1936.

Psychological Record—Bloomington, Ind.; Principia Press. Subscription $4.00. 500 pages annually. Edited by J. R. Kantor and C. M. [illegible]. Without fixed dates, each number a single research. General psychology. Founded 1937.

Journal of Consulting Psychology—Lancaster, Penn.; Science Printing Co. Subscription [illegible]. [illegible] pages annually. Edited by J. P. [illegible]. Bi-monthly. Founded 1937.

GEORGE BANTA PUBLISHING COMPANY, [illegible]